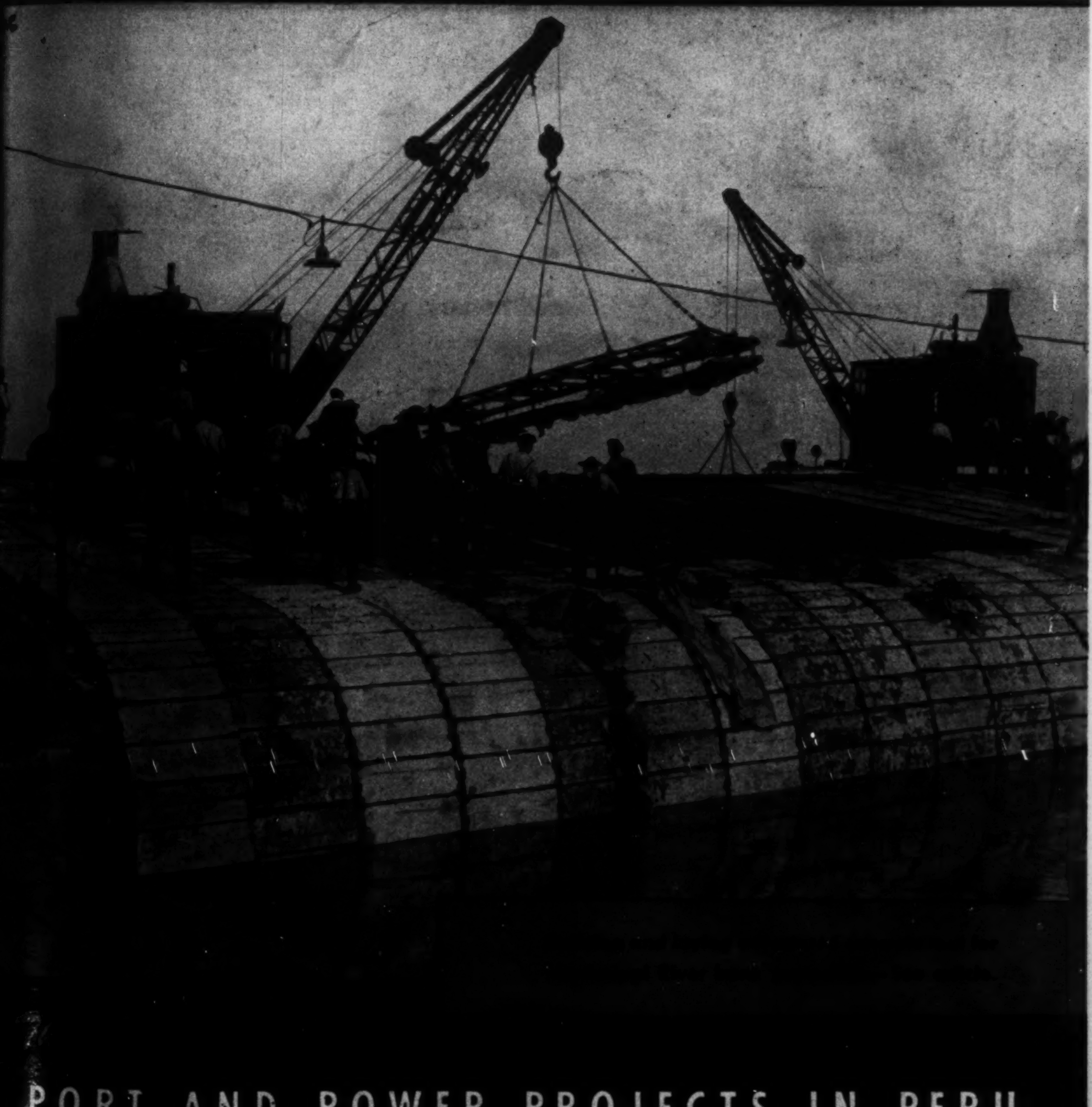
ENGINEERING NEWS-RECORD

September 21, 1944



PORT AND POWER PROJECTS IN PERU

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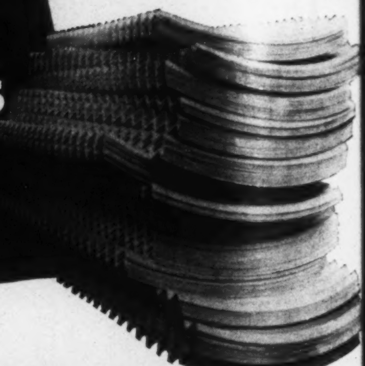

Erecting a "packaged" culvert, 165 inches in diameter.

Just as shipbuilding methods have been revolutionized by prefabrication and other time-saving methods, so will post-war construction be simplified and speeded by product manufacturers and contractors. One of these practical ideas is the "packaging" of small bridges and large sewers.

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JOHN ABBINK, *Publisher*
WALDO G. BOWMAN, *Editor* ALBERT E. PAXTON, *Manager*

Vol. 133 SEPTEMBER 21, 1944 No. 12

COMING NEXT

• Use of the Navy's steel pontoon cells for bridge construction in the Pacific constitutes an interesting engineering feat. In the Solomon Islands, for example, four parallel strings of 5 x 5 x 7-ft. cells were floated to the site and lifted into place by cranes to form a 75-ft. span. An 81-ft. span, three cells wide, was erected by bold and spectacular cantilevering. Details will be published in the Oct. 5 issue.

• Articles in the Oct. 5 issue of special interest to sanitary engineers include: Problems encountered in Peru by U. S. Army Sanitary Corps engineers in providing water supply, sewage disposal, malaria control, drainage and hospital facilities; a description of a war-inspired sewage disposal plant that can be used effectively in peacetime; a new graphical method for more rapid and accurate flow calculations in egg-shaped sewers; and a brief analysis of sanitation needs in the United States.

• Everything from tin cans to old bedsprings was found during removal and disposal of 150,000 cu. yd. of spoil for a depressed section of the Detroit Industrial Expressway. Earth slides, sloughing of material in open cuts, and excessive ground water further complicated construction. Detours and "shoofly tracks" to carry heavy traffic around nine railroad and highway underpasses were required. The methods used in overcoming these difficulties will be described in *ENR* for Oct. 5.

LOOKING AHEAD

• Elimination of roof supports to provide large covered areas without interior obstructions has long been a goal of structural designers. Recent test on a 12-ft. dia. model indicate that construction of a 300-ft. dia. building without interior columns, and with a roof of 22-gage steel sheets supported by air pressure of 20 psf. is possible. Neither unsymmetrical loading nor wind tunnel tests disclosed undesirable features. A report on this test will be published in an early issue. Likewise, a description of an air supported roof for a 70,000 bu. grain storage building erected in 1934 will be included.

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Number of copies of this issue printed: 36,038

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Due to the paper shortage, no index for the volume just completed, No. 132 (January-June, 1944) will be issued except to subscribers who ask for it. If you want a copy of the index please send in the coupon below. The index is now ready for distribution.

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HIGHWAYS

Illinois—Chicago—Archer Ave.—1941—Illinois Division of Highways—Contractor, John A. McGarry Co.

Illinois—Chicago—Pulaski Road—1943—Illinois Division of Highways—Contractor, Ready Coal & Construction Co.

Michigan—Muskegon— 1943-44 — Michigan State Highway Department — Contractor, Vinton Construction Co.

Minnesota—Nicollet County—Trunk Highway #14—1940— Minnesota State Highway Department—Contractor, Okes Construction Co.

Minnesota—Marshall County—Trunk Highway #25—1941— Minnesota State Highway Department—Contractor, Okes Construction Co.

Minnesota—Todd County — Trunk Highway #10 — 1941—Minnesota State Highway Department—Contractor, Western Contracting Corp.

New York—Rhinecliff—State Highway RC 4016—1939—Department of Public Works—Contractor, John Arborio, Inc.

NewYork—Valley Falls—State Highway FA-RC 40-16, —1940—Department of Public Works—Contractor, Fitzgerald Bros. Construction Co., Inc.

Ohio—Akron—Access Road 991—1943—Ohio State Highway Department—Contractor, Thorpe Construction Co.

Ohio—Cleveland—Bulkey Blvd. Grade Separation—1943—Ohio State Highway Department—Contractor, National Engineering & Contracting Co.

Ohio—Columbiana County—State Highway Route 165 —1943—Ohio State Highway Department—Contractor, G. B. & C. H. Patterson.

Ohio—Allen County—Federal Aid Projects DA-WI-9A, 9B and 24A—1943—Ohio State Highway Department —Contractor, Churchill Bros. Co.

Ohio—Lorain County—State Highway Route 611, Section A—1943—Ohio State Highway Department—Contractor, Dandrea, Nardini & Falbo.

Ohio—Huron County— State Highway Route 18 —1943 —Ohio State Highway Department — Contractor, A. J. Baltes, Inc.

Ohio—Lorain and Medina Counties—State Highway Route 18—1943—Ohio State Highway Department —Contractor, A. J. Baltes, Inc.

Ohio—Portage County—State Highway Route 5—1943 — Ohio State Highway Department — Contractor, W. M. Brode Company.

Ohio—Van Wert County—State Highway Route 418 —1943—Ohio State Highway Department—Contractro: J. A' Ross & Co.

Ohio—Columbiana County—State Highway Route 14 —1943—Ohia State Highway Department—Contractor. Frantz Bros.

STREETS

Akron, Ohio—Market St.—1943—City of Akron—Contractor, Thorpe Construction Co.

Appleton, Wisc.—Lawrence St.—1940—City Engineer —Contractor, Holz & Bass.

Chicago, Ill.—76th St.—1943—Chicago Department of Public Works & Buildings—Contractor, Calumet Coal Co.

Chicago, Ill.—S. Union Ave.—1943—Chicago Department of Public Works & Buildings—Contractor, Chatham Paving Co.

Lorain, Ohio—W. 21st St.—1943—City of Lorain—Contractor, Dandrea & Falbo.

Milwaukee, Wisc.—N. 45th St.—1939—Superintendent Streets, Construction & Repairs—Contractor, Bodeman Construction Co.

Milwaukee, Wisc.—Blue Mound Road—1939—Superintendent Streets, Construction & Repairs—Contractor, Bodeman Construction Co.

Minneapolis, Minn.— 2nd Ave. N.—1939—City of Minneapolis—City forces.

Minneapolis, Minn.—E. Franklin Ave.—1939—City of Minneapolis—City forces.

St. Louis, Mo.—17th St.—1943—City Engineer—Contractor, Eyermann Contracting Co.

St. Louis, Mo.—Subdivision development—1943—Contractor, Guy Curry.

South Bend, Ind.—Pleasant St.—1939—City Engineer —WPA labor.

AIRPORTS

Douglas Aircraft Corp.—Park Ridge, Ill.—1942-43—U. S. Engineers—Contractor, Standard Paving Co., White Consolidated Inc., Thomas McQueen Co.

Grenier Field—Manchester, N. H.—1942-43—U. S. Engineers—Contractor, Central Construction Co.

Hills Grove Airport—Hills Grove, R. I.—1943—U. S. Engineers—Contractor, Louis A. Byrne.

Howard Aircraft Corp.—St. Charles, Ill.—1943—U. S. Navy—Contractor, Standard Paving Co.

Lambert Field—St. Louis, Mo.—1943—U. S. Engineers —Contractor, Israel Bros.

Rome Air Base—Rome, N. Y.—1941-43—U. S. Engineers—Contractors, Turner Construction Co., Louis Mayersohn, Peckham Road Corp., Clinton Asphalt Co.

Stewart Field— Newburgh, N. Y.—1942-44—U. S. Engineers—Contractors, D. & F. Construction Co., John Arborio, Inc., L. G. DeFelice & Son, Inc.

Stewart Field—Aux. #1—Montgomery, N. Y.—1943—U. S. Engineers—Contractor, John Arborio, Inc.

Stewart Field—Aux. #3—Hackensack, N. Y.—1943—U. S. Engineers—Contractor, L. G. DeFelice & Son, Inc.

Syracuse Air Base—Syracuse, N. Y.—1942—U. S. Engineers—Contractor, Elmhurst Contracting Corp.

STREETCAR AND RAILROAD TRACK PAVING

Ingram, Pa.—1943—Pittsburgh Rys. Co.—Own forces.

Johnstown, Pa.—1943—Johnstown Traction Co.—Own forces.

Minneapolis, Minn.—Riverside Ave.—1939 and '41—Twin City Rapid Transit Co.—Own forces.

Minneapolis, Minn.—Chicago Ave.—1942—Twin City Rapid Transit Co.—Own forces.

Pittsburgh, Pa.—Fleming Ave.—1943—Pittsburgh Rys. Co.—Own forces.

St. Paul, Minn.—Randolph St.—1942—Twin City Rapid Transit Co.—Own forces.

South Bend, Ind.—SS & SBRR—1941—SS & SBRR—Own forces.

MISCELLANEOUS

Parking area—Sears Roebuck & Co.—Chicago, Ill.—1943—Contractor, Allied Construction & Supply Co.

Parking area—Municipal Airport—Chicago, Ill.—1943 —United Air Lines—Contractor, Ready Coal & Construction Co.

Riverbank paving—Johnstown, Pa.—Unit #6 Channel Improvement—1943—U. S. Engineers—Contractor, Wm. O'Neil Sons Co., Inc.

Drive and parking lot—Erie Coach Co.—Erie, Pa.—1943—Erie Coach Co.—Contractor, John Heubel, Sr.

Access roads—Goodyear Aircraft Corp.—Akron, Ohio —1943—Goodyear Aircraft Corp.—Contractor, Thorpe Construction Co.

Drives, streets and walks—Central Park Homes—Cleveland, Ohio — 1943 — U. S. War Housing Project — Contractor, Shaker Construction Co.

Curb, gutter and alley paving—Minneapolis, Minn.—1940-43—City of Minneapolis—City forces.

ENR-D-8

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he Week In Engineering and Construction

GINEERING NEWS-RECORD • SEPTEMBER 21, 1944 • VOLUME 133 • NUMBER 12

FWA survey shows lag in postwar public works plans

Less than 8 percent of 16 billion dollar local govern-ment program, including federal-aid work planned by state road departments, is completely planned.

Many members of the armed forces ecting to find immediate postwar em- yment on public works construction y be greatly disappointed unless ck action is taken to increase the vol- e of completed project plans. This he conclusion to be drawn from a deral Works Agency report released week on postwar planning progress state, county and municipal agencies. hough the study indicates a reservoir sixteen billion dollars of construction all stages of planning by local gov- mental bodies, projects that are in completely designed stage total only 144,000,000, and funds are available carry out but one-fourth of the proj- in this status.

Few active localities

This total is more disappointing when reakdown of the completed plans is de. This analysis reveals that only 9,000,000 of state highway work is dy for contract, and that two-thirds he $924,905,000 total (excluding cost land) of all other types of work for ch plans are ready was reported by state and local governments of only states—New York, California, Illi- , Michigan and Ohio. Further analy- shows that two-fifths of all completed ns for other than highway work is centrated in the five cities of New k, Chicago, Philadelphia, Detroit Los Angeles. The vast majority of cities under 25,000 population have de little planning progress.

right side of the survey picture is large volume of construction in the al design" and "preliminary design" ges. This total provides for over n billion dollars of work and in- des nearly two billion dollars of high- projects and some $5,044,000,000 other types of construction.

emainder of the sixteen billion dol- reservoir is in the "idea" stage. This class accounts for over eight billion dollars, including nearly two and one-half billion dollars of highway construction.

Report is conservative

In preparation of the report it was assumed that no plans had been completed nor were being prepared by those government units that failed to reply to the FWA questionnaire. As a result, in the totals of completed plans for other than state highway work no projects are included for four states, none for nine of the 92 cities of a population of 100,000 or more, and for only 252 of the 599 municipalities in the 10,000-25,000 bracket.

Neither do the totals include normal maintenance projects, work now underway or to be completed as part of the war program, public housing, and federally financed projects, such as river and harbor operations.

All projects being planned were listed as falling in one of nine classifications. The classifications were: (1) Highways, roads and streets; (2) bridges, viaducts and grade separations; (3) airports, terminals and landings; (4) sewer, water and sanitation facilities; (5) schools and other education facilities; (6) hospital and health facilities; (7) public buildings other than those in classes 5 and 6; (8) parks and other recreational facilities; and (9) miscellaneous public facilities.

On the basis of this classification the greatest volume of construction planned was in the "highways, roads and streets" category. This situation is explained by the fact that $50,000,000 of federal funds was made available to the states

(*Continued on page* 73)

N.Y. City ready to spend $400 million on 1945 construction if U.S. pays half

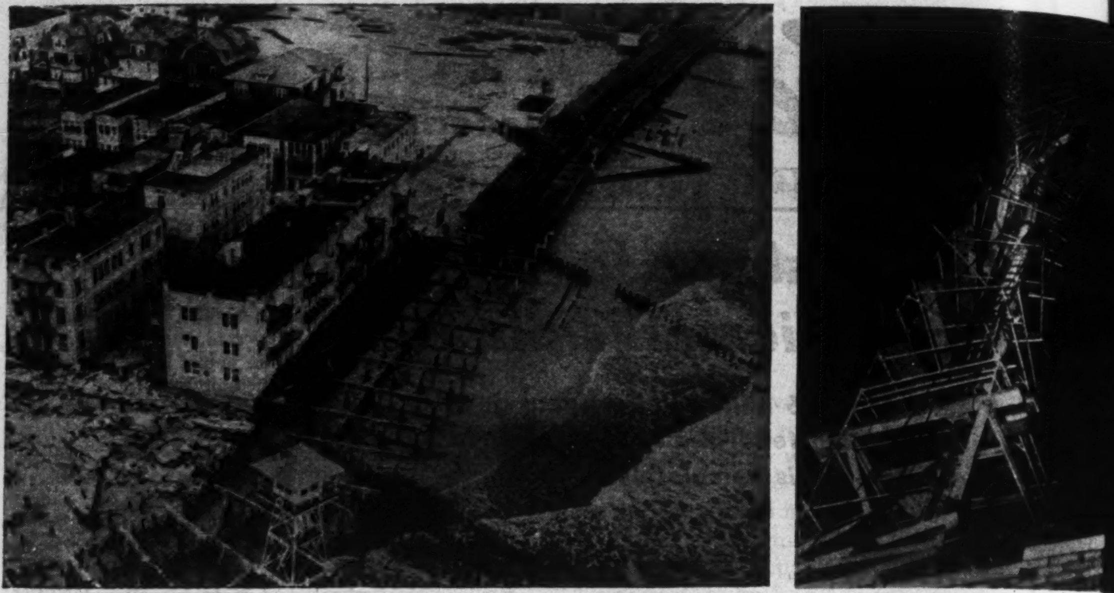
New York City is prepared to carry out a $400,000,000 construction program in 1945 if Congress acts at once to meet half the cost, Mayor F. H. LaGuardia declared last Sunday in his weekly radio broadcast. The mayor also disclosed that in his annual capital budget message to the City Planning Commission he had certified that the city might safely incur debt up to $300,000,000 for capital projects in 1945.

The mayor's $400,000,000 program is made up of $150,000,000 of new capital expenditures for work other than highways and housing, which he expects to be matched with federal funds in a like amount, $30,000,000 of federal and state aided highway work, $30,000,000 to $40,000,000 of low-cost housing, $20,000,000 of improvements covered by assessments, $15,000,000 of new work on the Brooklyn-Battery Tunnel, and $1,000,000 spent by the Triborough Bridge Authority.

Mayor LaGuardia stated that the city and the New York City Tunnel Authority were planning to apply to the War Production Board for priorities on about 700 tons of nuts and bolts needed before work can be resumed on the Brooklyn heading of the Brooklyn-Battery Tunnel, work on which was stopped early in th ewar. The Tunnel Authority has the castings for the lining but lacks the large forged bolts that must be on hand before soft ground tunneling from the Brooklyn end can get under way again. The New York heading is in rock, so it can start anytime.

In the interim since the work was shut down the Tunnel Authority, according to Ole Singstad, chief engineer, has completed all its contract drawings and so is in a position to put a large amount of work under contract at any time.

(*Continued on page* 72)



Acme Phot

Atlantic City bears the brunt of a tropical coastal storm

Worst damage from the tropical storm that lashed the eastern seaboard last week occurred to New Jersey beaches and beach structures. At Atlantic City miles of boardwalk were torn up and piers extensively damaged. Hotels and homes were flooded and power service disrupted. Pictured above is a section of the beachfront at the resort city.

There was considerable marine damage, especially to small boats, all along the eastern coast. Trees throughout the area were blown down, blocking highways and carrying electric and telephone lines with them. Fallen electric wires were said to be the cause of many of the more than forty deaths attributed to the storm. Adequate warning and early evacuation of beach areas kept down the death and property toll though the latter has been estimated by newspapers at as much as $50 million.

In contrast to the 1938 storm (ENR Sept. 29, p. 386 and Oct. 6, 1938, p. 425) there has been little damage to important struc- tures. A temporary pipe scaffold (right) extending 85 ft. above the roof of a 60-stor building in midtown New York City wa twisted but survived the 85-100 mph. gust of wind at the height of the storm. N bridges of noteworthy size were affected an there were no floods of more than local co sequence, despite two days of rain precedin the tropical downpour of the storm.

Serious water problems forecast for Arizona

Indications that large sections of central and southern Arizona soon may be confronted with a serious water problem as a result of a shortage of precipitation, now in its second year, were contained in a U. S. geological report issued Sept. 9 in Tucson.

The report, which dealt with ground water conditions and pumpage, showed that in Pinal County, pumping from underground supplies has risen from 372,000-ac. ft. in 1940 to 515,000-ac. ft. in 1943. In other regions, pumpage has increased proportionately.

Heavy decreases in water tables were also recorded in several areas. The report showed that in the Elroy area the table has dropped 12 ft. in the last two years and in the Maircopa district the drop was 10 ft. The total drop in the Elroy area from 1940 to Decmber, 1943, was 18½ ft. The Queen Creek area dropped 2½ ft. in 1942 and 3 ft. in 1943.

Governor and cabinet discuss Pittsburgh roads

A 5-year, $75,000,000, state highway improvement plan for Pittsburgh and Allegheny County was discussed by Governor Edward Martin and his cabinet at a meeting Sept. 8 in Pittsburgh. The plan involves 107 miles of road, and is part of the state-wide program to cost $516,000,000.

Plans for one-third of Allegheny County projects will be blueprinted by November, John U. Shroyer, secretary of highways, revealed. Plans for the Penn-Lincoln Parkway will be completed in October.

State and city officials have agreed tentatively to classify the Ohio River Boulevard extension as No. 1 project for postwar improvement, Penn-Lincoln Parkway to rank second in importance.

◆

Texas State Highway 183, a faster and shorter route to Fort Worth from North Dallas, is scheduled to be opened for traffic in October.

Illinois reports on postwar planning

Detailed plans and specifications hav been completed or are in progress fo $35,538,000 worth of postwar publi works in Illinois, exclusive of the cit of Chicago, according to a progress re port dated Sept. 1, by the Illinois Post war Planning Commission.

In addition to plans already com pleted, sketch plans for $54,396,00 worth of work have been completed o are now in progress; surveys have bee completed or are in progress for $18, 700,000 worth of construction; whil preliminary estimates only have bee prepared for $128,758,000 of postwa public works.

Improvements included in this pro posed $237,392,000 program cover street improvement, sanitary and storm water sewers, sewage treatment an water supply, schools and other publi buildings, bridges and grade separati structures, airports and parks, powe generating plants and distribution.

enate cuts postwar highway fund o $1,350,000,000 for three years

thorized annual appropriation for each of three years following e war set at $450,000,000 to be matched by the states

he Senate on Sept. 15 passed the den postwar highway bill (S. 2105) greatly amended form from the inal bill. Principal changes were duction in the amount authorized to ppropriated annually in each of the e postwar years from $650,000,000 the original bill to $450,000,000 oration of the 50-50 matching pro-ons of prewar years, and changes in method of apportionment. Elimi-ed were all provisions for using fed- funds for the purchase of rights-ay. The bill now goes to the House, re the Robinson bill is pending.

ction on the Robinson bill in the use (H.R. 4915) is to be postponed il after election, according to Major- Leader McCormack.

Distribution of funds

he $450,000,000 annual appropria- authorized in the Hayden bill is ided as follows: $200,000,000 for jects on the federal-aid system; 5,000,000 for projects on principal ondary and feeder roads; and $125,- ,000 for projects on the federal-aid tem in urban areas, communities of r 5,000 population.

he $200,000,000 for the federal-aid tem is to be apportioned among the tes by the old federal-aid formula, area, ⅓ population, and ⅓ post-road eage.

unds for secondary roads are to be portioned on the basis of ⅓ area, ⅓ al population, and ⅓ rural-delivery ds and "star routes." A further vision makes it possible for states ing a population density of more n 200 per square mile to expend se funds without regard to municipal ndaries. This provision would be ap-cable in Massachusetts, Rhode Island, necticut, New York, and Pennsyl-ia.

n states where the state highway de-tments have control over all public ds, the secondary road funds can be nt on the federal-aid system, if ap-ved by the U. S. Commissioner of blic Roads. States affected by this vision are Delaware, Virginia, West ginia and North Carolina.

unds for work in rural areas are to apportioned among the states in the io that the population of cities of 00 or over bears to the total popula- of all such cities in the country.

All references to using federal funds for the purchase of right-of-way that were included in the original bill were eliminated from the amended bill as passed.

Of the $450,000,000 to be appropriated for the first postwar fiscal year, the sum of $100,000,000 is to become immediately available to the states for making plans and surveys and for construction, but no other part of the funds can be used to pay the cost of contracts entered into before the beginning of the first postwar fiscal year.

Crossing eliminations

Not less than 10 percent of all three classes of funds must be used to eliminate highway-railway grade crossings. The construction costs of such projects, other than those paid by the railways concerned, may be paid out of federal funds without matching by state funds, provided the railways pay not less than 15 percent of the construction costs.

In states that find it impossible to match their full share of the federal fund, the Federal Works Administrator may waive the matching requirements provided: (1) That all special taxes on motor vehicle transportation are applied to highway purposes; (2) that least 90 percent go to operating, maintenance and administrative expenses and interest and amortization of highway bond; (3) that the rate of none of such taxes has been reduced since Sept. 1, 1944, and that the proportion of such funds that is available for construction, together with any other funds for highway purposes, will be inadequate to match the federal allocations.

Forest and park roads

The bill also carries $25,000,000 for each of the three postwar years for forest highways, $12,500,000 for forest roads and trails, $4,250,000 for construction and maintenance of roads in national parks, and $5,000,000 for parkways to give access to national parks or monuments.

Up to 1½ percent of the federal funds can be used for advance planning of future extensions of the federal-aid system and for secondary roads.

As the states will have to put up about $405,000,000 of matching funds, this represents a total federal-aid program of about $900,000,000 per year for three years following the war.

Bragdon made Engineers' Chief of Construction

Brig. Gen. John S. Bragdon has been made Chief of Construction in the Office of the Chief of Engineers in Washington. In this position he will have general charge of all military construction activity in continental U. S. He was transferred to the Chief's office from command of the South Atlantic Division at Atlanta. In that position, since 1941, he supervised one of the largest and most diversified of the war construction programs, for which he was awarded the distinguished service medal for "exceptionally meritorious service."

General Bragdon

General Bragdon is a West Pointer and has served all of his professional career in the army. He came out of World War I a Major in the Corps of Engineers. In 1929-31 he was on duty in the Philippines returning to serve in the Chief of Engineers Office. In 1937 he was made District Engineer at Providence, R. I., serving there until 1941.

Fowler to So. Atlantic Division

Brig. Gen. R. F. Fowler has been appointed division engineer of the South Atlantic Division of the Corps of Engineers with headquarters at Atlanta, Ga., succeeding Brig. Gen. John S. Bragdon. General Fowler was born in Alexander, Neb., on Oct. 14, 1884. He attended the University of Nebraska for two years before his appointment to West Point, from which he was graduated in 1910 and commissioned a second lieutenant in the Corps of Engineers.

General Fowler

General Fowler has led an active army life since his first tour of duty as assistant to the district engineer at Rock Island, Ill., in September, 1910, serving at many stations throughout the country and abroad. He was promoted to the grade of colonel Feb. 18, 1939, and on June 14, 1940, he became commanding officer of the 20th Engineer Regiment.

From July 1, 1941, until Jan. 5, 1942, he served as chief of the operations and training section in the Office of the Chief of Engineers. On Jan. 14, 1942, he was made chief of the supply division and on June 19, 1942, promoted to the temporary grade of brigadier general.

FROM AN EDITOR'S NOTEBOOK

A visit to the Tennessee Valley reveals that the effect of drought on power production, future TVA construction, disposal of surplus equipment and stream pollution are matters currently commanding attention.

Knoxville, Tenn—Most frequent subject of conversation in the upper Tennessee Valley is the drought that has continued over several months. However, despite the lowest natural streamflow in 40 years and the largest demand for power ever made in the area, the Tennessee Valley Authority has been able to supply all the electricity demanded of it. About 200,000 kw. of steam units are in constant operation now to conserve water against a possibility of prolonged low runoff in the late fall and some power is purchased from other utilities in the Southeast. Reservoirs are a little lower than a year ago, but water to produce 2.4 billion kwh. of electricity is in storage and there is no foreseeable danger of serious shortage.

Future TVA construction

The Tenessee Valley Authority has some definite plans for additional major construction but on a curtailed and much slower schedule than the rush to provide power for war necessary industry in the area.

The South Holston and Wautauga projects on the upper Holston watershed, on which $11 million was spent as emergency power projects before they were stopped by the War Production Board, are the best prospect for immediate work. When completed, the dams will give flood protection to Kingsport and Elizabethton and are planned to permit power installations. Resumption of construction is contingent upon availability of materials and manpower. A long construction period is contemplated.

The Fort Loudoun Dam extension, a project to take the water from the Little Tennessee River through Fort Loudoun Dam by construction of a dam and a canal, is now a future project planned for a time when power requirements overtake the present energy available in the Tennessee Valley. Added storage at Fontana, Douglas and other reservoirs on the headwater tributaries of the Tennessee has increased the dependable flow to a point where additional units are economical for many of the dams, but, once the war industries slacken, there may be excess power available from existing installations.

Foundation conditions at proposed sites for seven flood control dams on tributaries of the French Broad River above Asheville are being investigated preparatory to planning for possible postwar construction. Compared to other TVA structures, these will be rather modest, the seven dams being estimated to have a total cost, including reservoir rights, of $7 million. None of them will incorporate power facilities.

Fontana Dam

Construction at Fontana, N. C. on TVA's largest dam has progressed to the point where both of the hammerhead cranes used for construction have been dismantled and sent to storage. As of September 1, about 100,000 cu.yd. of concrete remained to be placed from a total of 2,800,000 cu.yd. Filling the reservoir is scheduled to start November first when flow in the Little Tennessee is expected to be sufficient to permit bypassing water to operate the Cheoah and Calderwood dams of the Aluminum Co., immediately downstream.

Considerable work remains to be done in the reservoir, including removal of 24 miles of railroad track, replaced by a 15.5 mile relocation of a branch line of the Southern R. R. above reservoir level. Part of the track is being left in place until the "last minute" to permit removal of construction equipment by rail. Highway hauling for heavy machines is precarious and expensive over the mountain roads.

Fontana construction forces have a war bond payroll deduction of 21.3 percent from 100 percent of the nearly 3,000 on the payroll. Purchases through the job accounting offices amount to 24 percent of the total payroll; were 20 percent after the fourth war loan and 15 percent after the third loan.

Something new has been added to construction at Fontana Dam. Project Manager F. C. Schlemmer has had a public address system installed on the project, not just in the mess hall and at the time-checking gate, as has frequently been done at shipyards, but with outlets all over the project so that workmen need not, in fact cannot, miss the broadcast. The address system is used to "sell" Americanism, bonds, safety and the importance of the construction job. Top members of the construction forces and visiting dignitaries make recordings that are put on t address system at various times to rea workmen on all shifts.

Kentucky Dam

Tva's greatest flood control dam, a second largest structure in concre volume, has reached final closure a pool-raising stage. The 184 mile lo reservoir, extending across most Kentucky and Tennessee to Pickwi Dam, has a capacity of 4,100,00 ac. of usable storage, said to be suffici alone to reduce flood heights at Cai Ill., by 2 ft. Use of the full pool cap city must await completion of railro relocation sometime next spring. (S *ENR* Aug. 31 1944, vol. p. 251).

Second-hand equipment

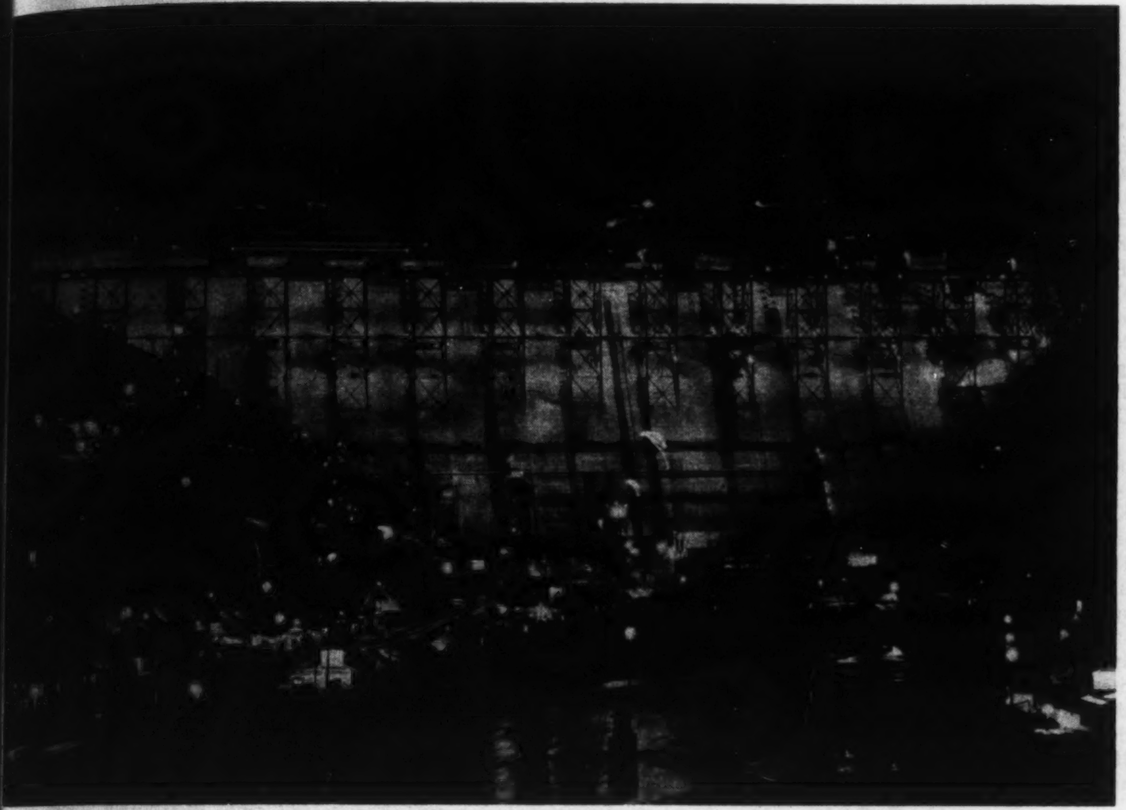
The Construction Plant Division the Tennessee Valley Authority is in t second-hand equipment business. Und direction of R. T. Colburn it is disposi of $8 million worth of used constructi equipment at a rate of $1 million month. Some $4 million worth of equi ment will be retained for possible futu work. Prices are good, sales brisk.

In some cases ceiling prices, base on a percentage of cost new in 194 are higher than cost of the equipme when it was purchased in the mid-thi ties, so TVA is getting almost first co for some long-lived, well-maintaine machines. Small pieces are movin rapidly, some larger units are going in storage. Government and war co tracts have preference; foreign cou tries are buying under approval of t War Production Board.

Incidentally, the Construction Pla Division of TVA, which has designe the plants for construction and supe vised the purchase of all of the co struction machines for the various dam is getting a big hand for the work it ha done. The scheme of doing the maj construction plant planning for all TV projects at a central point has worke out to the satisfaction of even tho who were opposed to the idea when was started in the early days of TVA Capable designers, familiar with equipment owned by the TVA, and ju as familiar with the entire constructi equipment market, were able to give t individual job the advantage of speci ist help. Perhaps most important all was the fact that the constructi plant division was made up mostly engineers, who had previously worke with contractors and understood t necessity for giving the "job" the ki of plant they wanted but with detai worked out for most rapid operati

Municipal affairs

A building code for the city of Kn ville, compiled by the Technical Soci



Concrete placed only at night on TVA's Fontana Dam

Fontana Dam, built by the Tennessee Val-ey Authority in western North Carolina, pproaches completion as mass concrete eaches roadway level in several blocks. This nusual night view shows only one of the wo hammerhead cranes used in the concrete lacing operations. One had been dismantled efore the picture was made, and the other as been taken down since, indicating the tatus of the project. Concrete is now being placed only on the night shifts to make the remaining cranes available for other work in daylight.

The dam, largest east of the Rockies and fourth highest in the world, will contain 2,800,000 cu. yd. of concrete and will be more than 470 ft. high above foundation rock. The hammerhead and whirley cranes are operating on what is known as the high-level trestle. The same trestle was used at midheight of the dam for the first stage.

Closure of the low-level outlets and start of filling of the reservoir is scheduled for Nov. 1. Two 91,500-hp., 75,000-kva. units are being installed initially with space provided for a third unit. Design and construction is being done by TVA's own forces. F. C. Schlemmer is project manager; Oren Reed, construction engineer and G. E. Murphey, construction superintendent.

f Knoxville and the local chapters of he American Institute of Architects and he Associated General Contractors of America, is now in the hands of the printer. The revised code provides for se of newly developed materials and ncorporates a procedure by which materials may be submitted for approval nd subsequent use as they become vailable in the postwar period.

Knoxville has plans for a new waterfront highway along the Tennessee River to be built possibly on a covered refuse fill. It is believed that the direct dor objection can be taken care of y immediate cover, but the possibility f river pollution from hydrogen sulphide, generated from surface water washing through the refuse, will require ome study.

Pollution of the Tennessee River is a erious problem. About 600,000 people ive along the Tennessee, but sewage treatment, of any sort, is provided for only 40,000. Industrial waste, with a population equivalent of 1,300,000 people, is dumped into the stream. Much of it is from pulp and rayon manufacture and is difficult and expensive to treat. TVA is cooperating with city and state health departments and with manufacturers to find ways and means of reducing pollution.

TVA on the march

Resale of electricity under TVA established rates has proved profitable to both the cooperatives and the municipalities that purchase TVA generated power. As postwar projects, several of the quasi-public organizations contemplate extensions of rural lines and construction of new buildings out of surplus. Some of the organizations that have been distributing TVA power the longest have reduced their residential electric rates to well below the TVA basic rate—100 kwh. at 2c, the next 250 kwh. 1c, and the next 700 at 0.4c. This makes the first 1,050 kwh. 0.73c and all in excess of this is 0.7c. per kw. Basic TVA rates start at 3c and reach a minimum of 0.75c per kwh.

Reflecting the interest of the world in the TVA experiment, negotiations are underway for translation of Chairman Lillienthal's book *Democracy on the March* into Italian, Portuguese, Hebrew and Chinese; a low cost edition is being printed in England, and orders for 1,000 copies at a time of the U. S. edition come from Australia. The Tennessee Valley Authority constantly is host to foreign engineers studying water utilization and regional development and a few engineers from China are spending several months in the Valley, studying all phases of the design and construction.—*H. W. H.*

News of the Engineering Schools

Frederic T. Mavis has been appointed professor and head of the department of civil engineering at Carnegie Institute of Technology, Pittsburgh, Pa., to succeed Prof. F. M. McCullough, who has retired. Mr. Mavis has held a similar position at the Pennsylvania State College since 1939.

His graduation from the University of Illinois in 1922 was followed by a period of professional practice with Kelker, DeLeuw and Co., consulting engineers in Chicago. Awarded the John R. Freeman traveling fellowship of the American Society of Civil Engineers, he spent the year 1927-1928 in Europe studying hydraulic engineering. From 1928 to 1939 he was on the staff of the State University of Iowa, serving some time as associate director in charge of the laboratory of the Iowa Institute of Hydraulic Research and as professor and head of the department of mechanics and hydraulics. Mr. Mavis has written and edited numerous papers and monographs in hydraulics, hydrology, and structural engineering.

An effort to formulate a description of the ideal engineering school graduate—as an engineer and as a citizen—for use as a basic guide in attacking the problems of postwar engineering education is being made at the Cooper Union School of Engineering, New York, it is announced by Dean George F. Bateman.

A faculty committee under the chairmanship of Louis M. Heil has been appointed to make a comprehensive study of the type of engineer the institution should endeavor to produce. This committee will consider not only the student's training in engineering, but also his ability to take his proper place after graduation as a valuable member of society.

The committee hopes, Dean Bateman said, to prepare a set of "specifications" which will describe the graduate in terms of all types of educational experience, rather than in academic requirements alone.

The project has been undertaken in the belief that too many specialized subjects have found their way into the conventional engineering school program, leaving too little room for necessary foundational subjects.

H. G. Baity is expected to arrive from Brazil this week to resume his duties as head of the sanitary engineering department of the Graduate School of Public Health, University of North Carolina. Dr. Baity has been on leave of absence from his post for almost two years, during which he has been serving as chief engineer and associate chief of party in Brazil for the health and sanitation division of the Office of the Coordinator of Inter-American Affairs.

In Brazil Dr. Baity has his headquarters in Rio de Janeiro, but he spent much of his time in the field directing the installation of sanitation facilities and construction of health centers in some remote parts of the country.

Restrictions relaxed on house remodeling

For the first time since the War Production Board clamped wartime restrictions on construction, that body will now permit one type of construction, in designated areas—which need not be war industry areas—without limit as to extent of work or dollar value. The new ruling covers remodeling and conversion of large apartment and dwellings to provide more small housing units in areas where the National Housing Agency finds an extreme housing shortage exists.

New York City is the first to be so designated, and it already has conversion applications on file with NHA. Despite that city's loss of wartime population, an acute shortage of middle-rent apartments is said to exist. This shortage could not be met under WPB restrictions, because the need was not for war workers.

Washington, D. C. is expected to be the second city to be named. NHA officials will make no estimate of how many areas will prove to be eligible for the unlimited conversion program, the number of buildings or units affected, nor the dollar value of the remodeling. They do say, however, that many thousands of new units may result.

Before an area can be designated as having an extreme housing shortage, it must be cleared with the Areas Production Urgency Committee of WPB. Thereafter, individual applications to remodel must be made on WPB Form 2896 and filed with the nearest FHA office. Approval of the application carries with it an AA3 priority rating, which WPB holds is in general sufficient for most materials required. Rents for the new units will have to be approved by the Office of Price Administration. The new program is designated H-3, under which housing heretofore has been permitted only to relieve individual cases of hardship.

Except in the areas approved by NHA, the provisions of WPB construction order L-41, limiting construction on a dwelling unit in any calendar year without WPB authorization to $200, and with a $1,000 limit for an apartment building to house six families, still apply.

◆

Employment of ten additional engineers to assist in designing the water board's $20,000,000 postwar program was approved by the Detroit, Mich., city council, recently. The engineers are needed to expedite the planning now being done on parttime by most of the board's 53 regular engineers.

N. Y. City to spend $400 million in 1945

(*Continued from page 67*)

The last official barrier to wide-spread conversion of large New York apartments and old tenements into badly needed living quarters was removed this week when Charles S. Ascher, regional head of the National Housing Agency, designated the city as an area of "critical housing shortage."

Mr. Ascher's order embraced the five city boroughs and Nassau County. It followed by only a day the announcement of the War Production Board that it would authorize resumption of remodeling work by private owners, but only in communities where the NHA decreed there was a pressing need for additional housing (see report at left). This was believed to be the first area in the nation so designated.

On a twelve-acre site in Harlem overlooking the Harlem River, the Metropolitan Life Insurance Co. is planning to erect a modern residential community for 1,200 families. The new development is to be known as Riverton.

No estimate of the cost was available, but realty and building experts figured that the structural investment alone would amount to $5,000,000.

A survey shows lag postwar works plans

(Continued from page 67)

e preparation of highway plans on 50 percent matching basis. State nments also indicated that much l and hospital construction is con- lated, while work being planned by metropolitan areas includes nu- s sewer, water and sanitation jobs. all areas, schools ranked high in ype of work which is now being mplated.

ta obtained as to available funds rry out the proposed projects re- d that money is available or obtain- from local sources for one-fourth projects for which plans are com- d. Replies indicated further that, early another quarter of the proj- the probable source of funds would axes, service charges and licenses. owing was anticipated in only a few . Many reports indicated that the e of funds was unknown or that the cy was hopeful of federal aid.

Legislation and funds needed

e failure of the cities of under 25,- population to complete plans was ained, in the majority of cases, by lack of either funds or legislative ority, or a combination of both. For mple, 27 state governments and 53 s of over 100,000 population are in predicament. In only four states, ely, New York, California, Michigan New Jersey, has legislation been ed to provide state funds to aid nty and municipal governments on nning, says the report.

he Federal Works Agency, for which . Gen. Philip B. Fleming is admin- ator, made the report for the special mittee on postwar planning of the se of Representatives. This com- ee, known as the Colmer committee, uested the survey to better evaluate eral Fleming's view that satisfactory ncing methods for postwar planning t be made available to many local ernmental bodies if they are to pre- e plans.

eneral Fleming recommended to the mittee a few months ago that a 0,000,000 planning fund should be vided by Congress for this work, e of the money to be spent as grants 50-50 matching basis, but the major portion to be distributed as loans or ances, to be repaid when the work is structed. After making a study of findings of the survey completed last k, General Fleming still believes a substantial federal fund is needed increase the tempo of postwar plan- g to the rate desired in order to get best results.

JOBS OF THE WEEK

RETAINING WALL, Michigan

Sunswick Corp., New York, N. Y., has been awarded a contract by U. S. Engineers, Detroit, Mich., for a retaining wall, at Sault Saint Marie lock at an estimated cost of $1,000,000.

BRIDGE, California

California State Division of Highways, Sacramento, Calif., received low bid of $727,858 for reconstructing a portion of existing bridge across the Sacramento River, at Rio Vista, from Lord & Bishop, and A. Teichert & Son., Inc., Sacramento, Calif.

RECYCLING PLANT, Katy, Tex.

Hudson Engineering Co., Houston, has been awarded a contract for the design and construction of a recycling plant addition for the Humble Oil & Refining Co., Houston, Tex. The estimated cost is $700,000.

STOREHOUSE, Williamsburg, Va.

Bureau of Yards & Docks, Navy Department, Washington, D. C., awarded a contract for constructing storehouse, shed and storage building, at Naval Supply Depot, to Virginia Engineering Co., Inc., Newport News, Va., at $2,470,000.

BARRICADES, Merrimac, Wis.

Graham Paving & Construction Co., Chicago, Ill., was lowest bidder at $645,838 for barricade construction at Badger Ordance plant, for U. S. Engineers, Milwaukee. Mason & Hanger Co., New York, N. Y. is engineer and architect.

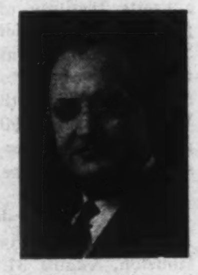
Note—Additional bidding and contract news on many projects large and small appear in the Construction News section beginning on page 181.

Low bids announced for Chicago filter plant

Low bids were received on Sept. 13 covering construction of the superstructures of the filtration and administration buildings at Chicago's South District filtration plant, according to W. W. DeBerard, city engineer. An attempt was made last July (*ENR*, July 20, vol. p. 62) to let a contract for this work, based on anticipated priorities of necessary materials, but no contract was awarded at that time due to the confusion among bids received covering the several alternate materials involved in the undertaking.

Priorities on all necessary materials now have been acquired and the work has been divided into four units to expedite the awarding of contracts. A total of 13 contractors, all from the Chicago area, submitted bids on the various divisions of the work, the largest of which includes reinforced concrete and masonry construction, ventilation, and electrical and architectural work. The three low bidders for this work are: S. N. Nielsen Co., $1,497,000; Gust A. Newberg Construction Co., $1,528,700 and W. E. O'Neil Construction Co., $1,534,-590. Low bids of $82,120 were submitted by Robt. Gordon covering heating facilities and equipment, and $13,250 for piping. W. T. Mahoney & Sons' bid of $49,600 was low for the plumbing, sewers and drains.

Hays in Palestine on irrigation surveys



James B. Hays is now in Palestine in connection with proposed work on irrigation and flood control projects in that country. The work is under the direction of a privately-financed group known as the Commission on Palestine Surveys (*ENR* May 25, 1944, p. 772).

Some 900,000 ac. ft. of storage is proposed at three main dams with 450 miles of principal feeder canals. At present Palestine depends on dry farming. It is said that three times the present population of 1,500,000 can be supported in the country under the proposed irrigation plan.

Mr. Hays will investigate the proposed dam sites and make preliminary studies and plans in cooperation with engineers in Palestine. He has been with the Commission on Palestine Surveys for more than a year, working in this country on advance planning. Hays formerly was construction engineer for the Tennessee Valley Authority at Chickamauga and Kentucky dams and before that was with the Bureau of Reclamation on irrigation work.

OBITUARY

Edward H. Heinneman, assistant to the regional director for the Bureau of Reclamation at Amarillo, Texas, died Sept. 10. Mr. Heinneman, a graduate of the University of Denver, had worked on the Boulder Dam, on the Central Valley project, and in Washington, D. C.

Mark L. Reed, Jr., 40, Asheville, N. C., contractor, died Sept. 6. President and treasurer of Reed and Abee, Inc., contractors, Reed was widely known for office buildings he had constructed throughout North Carolina.

John P. Cullen, 77, a leading general contractor in Wisconsin died Sept. 4 at Janesville. He had many large contracts in Wisconsin, Indiana, Iowa, North and South Dakota, Nebraska, Illinois, and Florida. He served two years as president of the Wisconsin Constructors, Inc., and two terms as president and later director of the Wisconsin chapter of the Associated General Contractors of America.

James Page, 79, a retired consulting engineer at one time connected with the Port of New York Authority, died in Baltimore, Md., Sept. 11. After his graduation from Johns Hopkins in 1882 Mr. Page took special courses at Massachusetts Institute of Technology. He prepared publications for the United States Hydrographic Office, 1893-1905; was chief of the division of ocean meteorology of the United States Weather Bureau, 1907-08; and chief engineer of the water supply and sewer system of Cienfuegos, Cuba, 1908-12.

Payton M. Marshall, 55, Houston, Tex., contractor since 1905, died at Houston, August 31. He built and remodeled many Houston buildings.

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Big new naval hospital for San Francisco area

Plans for the early postwar construction of a $6,500,000 permanent hospital in the San Francisco Bay area were announced recently by Twelfth Naval District headquarters in San Francisco.

The hospital will be a 1,000-bed, fireproof concrete or brick structure comprising 12 main buildings and six subsidiary buildings, and will require a 100-acre site. Naval authorities said the hospital probably will be located on the west side of the bay in proximity to the U. S. Naval drydocks at Hunter's Point.

A.S.C.E. field secretary named on Pacific coast

H. L. Thackwell of Pasadena, Calif., has been named field secretary for the American Society of Civil Engineers to serve the eleven Western states and Texas. For the present Mr. Thackwell will make his headquarters in Pasadena.

Appointment of a field secretary who would be resident on the Pacific Coast was authorized by the Board of Direction of the society some months ago in order to give the members in that region closer contact with the secretarial staff, and to make available to the local sections and student chapters the services of a member of the staff on questions arising in connection with matters in which the society is currently interested, such as collective bargaining.

Mr. Thackwell has been in engineering work in the Southwest and Latin America for the past 30 years, specializing largely in sanitary engineering.

MEETINGS

National

AMERICAN PUBLIC WORKS ASSOCIATION, annual congress, Hotel St. Paul, St. Paul, Minn., Sept. 24-27.

INSTITUTE OF TRAFFIC ENGINEERS, 15th annual meeting, Sherman Hotel, Chicago, Ill., Oct. 1-4.

AMERICAN PUBLIC HEALTH ASSOCIATION, second wartime public health conference and 73rd annual business meeting, Hotel Pennsylvania, New York, N. Y., Oct. 3-5.

FEDERATION OF SEWAGE WORKS ASSOCIATION, annual meeting, William Penn Hotel, Pittsburgh, Pa., in conjunction with 17th annual conference of the PENNSYLVANIA SEWAGE WORKS ASSOCIATION, Oct. 12-14.

INTERNATIONAL CITY MANAGERS' ASSOCIATION, annual conference, Medinah Club, Chicago, Ill., Oct. 12-17.

AMERICAN WELDING SOCIETY, 25th annual meeting, Hotel Cleveland, Cleveland, Ohio, Oct. 16-19.

SOCIETY FOR EXPERIMENTAL STRESS ANALYSIS, fall meeting, Carter Hotel, Cleveland, Ohio, Oct. 17-20.

ENGINEERS' COUNCIL FOR PROFESSIONAL DEVELOPMENT, 12th annual meeting, 29 West 39th St., New York, N. Y., Oct. 20-21.

AMERICAN MUNICIPAL ASSOCIATION, annual conference, Hotel Blackstone, Chicago, Ill., Oct. 25-27.

NATIONAL COUNCIL OF STATE BOARDS OF ENGINEERING EXAMINERS, annual meeting, Hotel Lafayette, Lexington, Ky., Oct. 30-31.

AMERICAN INSTITUTE OF STEEL CONST
TION, annual meeting, Atlantic City, N.
Oct. 31-Nov. 2.

HIGHWAY RESEARCH BOARD, annual me
ing, Netherlands Plaza Hotel, Cincin
Ohio, Nov. 22-25.

Regional and Local

NORTH CAROLINA LEAGUE OF MUNICIP
TIES, 36th annual conference, Winst
Salem, N. C., Oct. 4-6.

GEORGIA WATER AND SEWAGE ASSOCIATIO
13th annual meeting, Georgia Institute
Technology, Atlanta, Ga., Oct. 5-7.

SOUTHWEST SECTION, AMERICAN WA
WORKS ASSOCIATION, Stephen F. Aus
and Driskill Hotels, Austin, Texas, O
17-19.

MISSOURI VALLEY SECTION, AMERICAN W
TER WORKS ASSOCIATION, Hotel Preside
Kansas City, Mo., Oct. 23-24.

CALIFORNIA SECTION, AMERICAN WA
WORKS ASSOCIATION, annual meeting, Ho
Biltmore, Los Angeles, Calif., Oct. 24-26.

WEST VIRGINIA SECTION, AMERICAN WA
WORKS ASSOCIATION, annual meeting, Ho
Chancellor, Parkersburg, W. Va., Oct. 26-2

ENGINEERS' SOCIETY OF WESTERN PENNSY
VANIA, 5th annual water conference, Wi
liam Penn Hotel, Pittsburgh, Pa., Oct. 30-3

CAROLINA BRANCH, ASSOCIATED GENERA
CONTRACTORS OF AMERICA, 24th annu
meeting, Carolina Hotel, Southern Pine
N. C., Oct. 30-31.

WEEKLY CONSTRUCTION SUMMARY

CONTRACTS

Continental U. S. Only
(Thousands of Dollars)

	Week Ending		
	Sept. 23 1943	Sept. 14 1944	Sept. 2 1944
Federal	$54,094	$27,436	$9,88
State & Municipal	8,366	8,041	4,95
Total public	$62,460	$35,477	$14,83
Total private	9,491	6,993	4,39
TOTAL	$71,951	$42,470	$19,2

Cumulative
1944......(38 weeks)......$1,348,71
1943......(38 weeks)......$2,437,65

Note: Minimum size projects include are: Waterworks and waterways project $15,000; other public works, $25,000; industrial buildings, $40,000; other build ings, $150,000.

NEW PRODUCTIVE CAPITAL

	Cumulative	
	1943 38 Weeks	1944 38 Wee
NON-FEDERAL	$276,461	$346,55
Corp. Securities	17,408	96,04
State & Mun.	98,920	109,72
RFC Loans	9,000	57,79
FPHA Loans	3,133	....
REA Loans	20,000	20,00
Fed.-Aid Hwy.	128,000	63,00
FEDERAL	$2,753,838	$1,263,80
TOTAL CAPITAL	$3,030,299	$1,610,8

ENR INDEX NUMBERS

Index base=100		1913	192
Construction Cost	Sept. '44	300.46	144.4
Building Cost	Sept. '44	236.00	127.8
Volume	Aug. '44	121.	53.

Comment and Discussion

Readers' opinions on matters that concern engineers and contractors

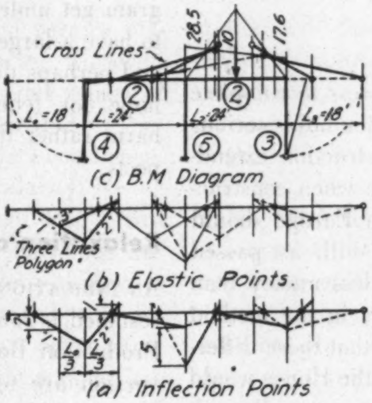
Moment Balancing

Sir: In the paper "Moment Distribution by Linked Rigidities", (*ENR* June 1, 1944, vol. p. 802), D. B. Steinman has shown a most interesting graphical method for moment distribution. However, a greater speed in distribution of moments may be obtained with the graphics termed "three line polygons" and "cross lines", as illustrated in the accompanying sketch.

The inflection points on the member axis are determined with line 2 drawn through the stiffness ordinate at the support and one-half basic stiffness at the third point of span, sketch (a). The stiffness ordinate at the support represents the stiffness of support as determined with line 1 drawn through the inflection point at the far end and one-half basic stiffness at the third point of the span. The basic stiffness is the ratio of the moment of inertia to the span length, I/L. The basic stiffnesses are shown in the circles sketch (c).

The elastic points on the member axis are determined with "three-line polygons", sketch (b). Line 2 in sketch (b) is the same as that shown in sketch (a). Line 1 is drawn through the inflection point at the far end and the stiffness ordinate at the support. Line 3 is drawn through the intersection point of line 1 with the vertical at the third point of the span and one-half basic stiffness at the third point in the following span. The intersection point of line 3 with the member axis is the elastic point.

The closing line in the moment diagram in sketch (c) is drawn through the closing points on the inflection point verticals determined with the "cross lines". The cross lines are constructed on the central moment ordinates. The inflection points and the central moments in the haunched beams are determined with constants given in the booklet entitled, "Analysis of Continuous Frames by Graphical Distribution of Moments", published by the writer.



Distribution of moments in the accompanying sketch is entirely graphical, and the procedures are not increased in geometric proportion to the number of spans.

A. A. EREMIN,
Associate Bridge Engineer,
California State Highways,
Sacramento, California

Air in Concrete

Sir: The editorial "Toward More Durable Concrete" (*ENR*. Aug. 24, 1944 vol. p. 213) contains the statements quoted below which appear to the writer to be an example of the confused comprehension of air-entrainment in concrete:

"If strength is not to be seriously affected air should not greatly exceed 3 percent; in other words unit weights should not be reduced more than from 148 to about 143 lb. per cu. ft. And where it is important to avoid loss of strength the mix should be redesigned by reducing both sand and water content by about the volume of the added air, thus in effect reducing the water-cement ratio."

It is important in discussions of the air content of concrete to distinguish clearly between air-content, per se, and what is referred to as "added air" in the editorial. Concrete made with plain cement may contain air in amounts varying from slightly less than 1 percent to as much as 3 percent. Generally, the air content of concrete, having a normal cement content, is between 1.5 and 2 per cent. Therefore, it would be an inadequate use of the potentialities of air-entraining cement to require that "air should not greatly exceed 3 per cent". Actually, it has been concluded by most investigators that the *added* air need not greatly exceed 3 per cent to realize the potential advantages of this type of cement. This would bring the total air content close to 5 per cent.

In this connection, attention is invited to the statement in Appendix 1 to the Annual Report of A.S.T.M. Committee C-1 on Cement for 1944 (preprint No. 41, p. 70) that "extensive field experience and laboratory tests have shown that an air content in concrete of 5 to 6 per cent is the optimum for obtaining maximum workability, bleeding reduction, and durability with a minimum of strength reduction". That statement was written by this writer with the firm belief in the old axiom that one cannot have his cake and eat it, too. Strength need not be sacrificed greatly, if at all, but the object in using air-entraining cement is to obtain the properties peculiar to its use. If strength of test specimens is of greater importance, plain cement should be used.

Issue is taken, too, with the use of the word "re-design" with regard to mixtures containing air-entraining cement. All concrete mixtures should be *designed* with the materials to be used on the project, including the particular brand and type of cement whether or not "loss of strength" is to be avoided. It is true and important that air-entraining cement mixtures will possess appreciably lower sand and water contents if properly designed in optimum proportions than would mixtures of similar workabliity containing a similar amount of plain cement, but this is not accomplished by "re-design".

Your very truly,

CHARLES E. WUERPEL,
Engineer-in-Charge U. S.
Central Concrete Laboratory,
Corps of Engineers,
Mt. Vernon, N. Y.

EDITOR'S NOTE—The air referred to in the editorial was "added air" as the reference to reduction of unit weight shows. It would have been better to have said so more definitely. "Re-design" is probably what everyone will do the first time he uses the new cements, but Mr. Wuerpel is right in insisting on explicit terminology.

EDITORIALS

VOLUME 133 NUMBER 12

September 21, 1944

Compromise Needed

THE CONTINUED FAILURE of Congress to complete action on postwar highway legislation holds serious threat of set-back to highway construction extending many months beyond the time when construction can be resumed if the war in Europe should end soon. The amended Senate bill, as passed last week, now carries somewhat less money than the House bill, and the two differ in the method of apportionment. It would seem that these differences could be adjusted quickly if the House would act on its bill, but that body has put all such things aside until after election. If Congress, when it reconvenes, is preoccupied with war legislation or reconversion, there may be further weeks of delay, thus leaving the states in uncertainty at the time their own highway legislation should be in preparation. Responsibility for this condition is not entirely the fault of Congress. A considerable part rests with the state highway authorities for their failure to agree on what they would ask from Congress in the way of postwar highway legislation. All of which means state highway officials can help speed action by Congress by not being too insistent in demanding that their particular ideas be written into the final law.

Subsidies for Local Work

NEW YORK CITY, according to Mayor LaGuardia, has $400,000,000 of postwar work ready to put under contract in 1945 should the war end—provided the federal government will put up half the cost. From what has been said recently in Congress with respect to curtailment of non-war expenditures the prospect for federal aid, other than for highways and perhaps for low cost housing, appears remote indeed. More basically, however, local postwar construction, to be effective in quick relief of possible unemployment, should be independent of federal aid. Hence it seems unfortunate that New York, which has set such a splendid example in getting plans in shape for an early start, should take the lead in asking Congress for large grants, thus in effect passing control over its program to the federal government. Obviously, any community that asks for and accepts a large federal gran must also accept a large measure of federal con-trol. That means another big PWA organizatio and all the delays inherent in remote control from Washington. New York has $150,000,000 o work, which can be put under way without a sub-sity. Better to have this really substantial pro-gram get under way without strings attached than to have a large program dominated by Washington and perhaps delayed by it. New York's expressed hope for federal aid, if pushed too hard, can harm rather than help postwar construction prospects.

Relaxation of Restrictions

AN INDICATION of how normal construction may be resumed is found in the announcement of the War Production Board that restrictions on house conversion are to be lifted in areas where there is a critical shortage of housing to permit the conversion of large houses and apartments into smaller units. A considerable amount of construction composed of many relatively small operations can be put under way in this manner, thus giving WPB a measure of the effect of such relaxation on war activities. Indeed it could go farther and permit other types of small jobs—culverts, water and sewer line extensions, street paving and the like—to go ahead. They require a minimum of transportation service and special material, and, moreover, can give employment quickly in a large number of widely-scattered communities. If no effect detrimental to the war effort develops, then further relaxation should be possible. The immediate result of such minor relaxation of restrictions on construction may not be apparent, but it will have the cumulative effect of getting more and more contractors back into action, thus facilitating a more rapid expansion of the larger jobs when the time comes to lift restrictions completely.

Transportation Trends

CONSTRUCTION OF A UNION TERMINAL for over-the-road freight trucks in New York City after the war, as proposed by the Port of New York Authority, is indicative of a trend in freight handling that should result in much more construction of a like nature in the postwar period. The Port Authority's new truck terminal is designed to save a large amount of cross hauling by trucking companies just as its big offrail freight terminal built several years ago was designed to reduce the unnecessary hauling of part loads from Manttan to rail terminals in New Jersey. The Port thority plans similiar union truck terminals in w York City and in adjacent New Jersey based studies now being made. Like union truck facilis could be used to advantage in other cities.

rthquake Lessons Repeated

HE PICTURE OF ROOF PARAPET and cornice manry piled across the entrance to the Cornwall nt., school, published last week in our report of e Sept. 5 earthquake, has a startling resemlance to those published following the Long Beach, alif., quake of 1933. Such similarity is—or hould be—disconcerting, and it can also prove rtuitous. That schools and other buildings are ill being topped-out with unstable masonry is use for anxiety, as is the realization that an rthquake sufficiently strong to throw down paraets, cornices and plaster in wholesale manner has ccurred in the Northeastern United States and djacent parts of Canada. The fortuitous element f the similarity to damage in the Long Beach uake (and to that incurred in 1925 at Santa arbara, too, for that matter) is that an awakening especting earthquake-proof design may ensue, simlar to that which took place in California.

If design changes to make structures reasonably esistant to earthquakes were either extensive or xpensive there would be more excuse for the existg situation. They are neither, however, and to nchor parapets and cornices sufficiently to resist e horizontal forces of the great majority of earthuakes involves not much more than should be one to take care of a reasonable wind load.

It is to be hoped that the extensive damage at ornwall may cause Easterners to look with a ittle less complacency and self satisfaction on heir "safer" location as compared to the West oast, even though the record so far may favor hat belief. Earthquakes "can happen here", and re happening every year. Someday one will ocur when school is in session, and children will be rushed by falling masonry. Engineers and archiects should not wait for such a tragedy to cast oubts upon their abilities.

Anchor parapets, or don't use them. Provide easonable resistance to horizontal forces in foundations, frames, floors and walls. These are the essons that all earthquakes have emphasized, and his latest one merely repeats them.

A Two-Fold Objective

PARTICIPATION of the United States government in the development of industrial and other resources of South America has given rise to frequent expressions of concern in this country. Principal cause of alarm is the belief that our financial loans and other aids directed toward foreign industrialization will destroy markets for many goods that are now exported from the United States. Quite conceivably, such ideas may be generated by a reading of the article on Peru's industrialization of the Chimbote Bay region (page 96). Further reflection, however, will reveal that the United States stands to gain by extending a helping hand to countries like Peru, where strenuous efforts are now being made to improve economic conditions.

For example, when Peru has completed its iron and steel plant it will be in a position to produce rails, reinforcing bars and cast iron pipe, which are now imported at high prices because of shipping charges. The dollar exchange thus freed should then be available for the purchase of more expensive steels and finished products whose dollar value is high in comparison to weight. Furthermore, production of heavy-tonnage iron products in Latin-American countries can hardly be considered a threat to our export business because in the past much of this was supplied by Europe anyway. Likewise, in connection with the development of hydroelectric power facilities, any aid that we contribute should result in almost immediate benefits to exporters of electrical equipment and certain types of consumer products.

Another, less tangible, benefit from promoting higher standards of living in South America, is the contribution that this will make in the establishment of more stable governments and future world peace. It is axiomatic that when the living standards of a people are being improved, the likelihood of dissatisfaction with the government that provides such benefits is largely eliminated. A final argument that favors our support of industrial developments in the countries south of the border may be drawn from our past experiences in foreign trade, viz., that our best customers are also our biggest competitors.

In many respects, the engineering and financial aid we may give to Peru might well be considered a selfish strengthening of our foreign markets as well as a contribution to hemispheric solidarity.

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ENGINEERING ABROAD
AS SEEN BY ENR EDITORS

Steel-Paved Steps to Tokyo

H. W. Richardson

Western Editor, Engineering News-Record

***Contents in Brief**—The northern road to Tokyo follows the 2,000-mile sweeping curve of the Alaska Peninsula and the Aleutian Islands. Along this road the armed forces have built a series of airports on the barren Arctic tundra that form aerial stepping stones to the Nip homeland—steel-paved steps that are surfaced with steel plank mat. This steel paving has made fast construction of the airfields possible. As the task forces moved westward, island by island, each conquest brought new problems in runway construction. At Adak the field was built in a tidal swamp closed off from the sea by a sand dike; at Amchitka the strip was built under enemy bombing.*

FROM THE MAINLAND OF ALASKA, down the narrow curving length of the Alaska Peninsula and on out to the far end of the chain of bleak Aleutian Islands the armed forces are building a series of airports—a 2,000-mile military lifeline. The landing strips are hard surfaced as far westward as the middle of the peninsula. But from there on they are mostly steel mats—one of the war's miracle products—for they are being built in a hurry far from sources of materials and equipment.

These fields are an extension of the airport network in the interior of Alaska and the southeastern panhandle. They were started for the defense of the mainland, carried ahead for clearing the Japs out of the Aleutians, and now stand as steel-paved steps to Tokyo. Already the north end of the Nipponese empire at Paramushiro has been bombed from Aleutian bases.

Army, Navy and civilian job

Contractors, Navy Construction Battalions and Army Engineer troops have all participated in building the Alaska-Aleutian airport network. In the interior of Alaska and along the seacoast fringe of the mainland several fields were contractor-built for the Civil Aeronautics Authority as a peace-time operation. When Alaska became a vital defense zone the army engineers took over many of the CAA projects, improving some by contract, others by engineer troops. Then the army went ahead with other airports, again letting some by contract and building others with troops.

In August, 1940, with the start of defense construction in this country, the army engineers moved into Annette Island, near Ketchikan, Alaska, to build the first big air base for the protection of the Alaskan coastline. When this was completed, they moved further up the coast to Yakutat, on a similar project. Mud, deep, sticky, endless mud, soaked by the Alaskan coastal rains that total 180 in. per year, and churned up by scrapers and other dirt-moving equipment, proved to be the biggest difficulty in building these two bases. Eventually they were completed, with concrete-paved strips, and the engineers moved on westward.

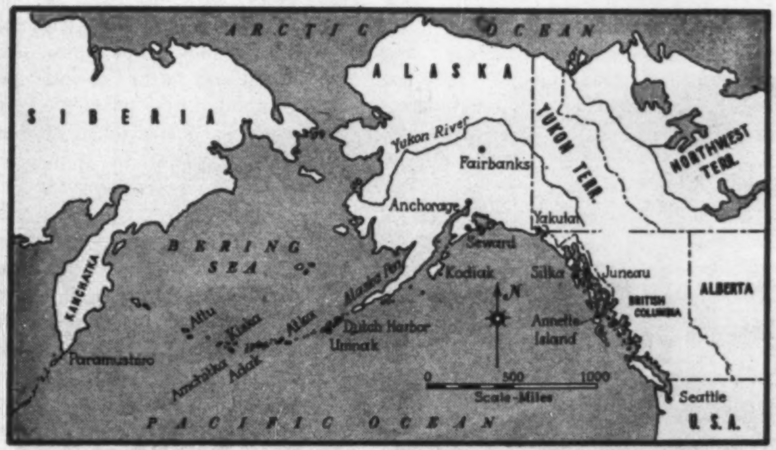
Meanwhile, the Navy was at work on its three principal Alaskan bases—Sitka, Kodiak and Dutch Harbor. At first all the navy work in this territory was done by contract, but in the summer of 1942 the contracts were terminated and the work was taken over by the Seabees. Each naval base includes landing strips for both land-based and amphibious planes. In addition to the airports at the bases, the army built substantial supporting airfields nearby.

The supporting field for Dutch Harbor played an important part in thwarting the Jap attack on that base in June, 1942. Because of the ruggedness of Unalaska Island, upon which Dutch Harbor is located, the next island westward, Umnak, was selected as the site for the auxiliary army base.

Surprise for the Japs

Construction work at Umnak was kept secret, and at the time of the Jap attack on Dutch Harbor had been completed far enough to accommodate a fighter squadron. When the Jap struck with a superior force, land-based planes from Umnak came to the rescue. The Nips were so surprised to see planes attacking them from the west that, after getting in a few damaging blows, their fleet turned tail and ran westward, finally landing forces at the unoccupied island of Kiska, Aggatu and Attu at the far end of the Aleutions. It took us 15 months to clear the enemy off these last islands.

As part of the air route from the mainland to the islands the army built three substantial fields at Naknek, Port Heiden and Cold Bay along the north side of the long Alaska peninsula. Some of the engineer troops that slashed the pioneer road of the Alaska Highway through the wilderness participated in the construction of these facilities.


ARCTIC OCEAN
ALASKA
SIBERIA
Yukon River
Fairbanks
YUKON TERR.
NORTHWEST TERR.
Anchorage
Yakutat
Seward
BERING SEA
KAMCHATKA
Kodiak
Sitka
Juneau
BRITISH COLUMBIA
ALBERTA
Attu
Kiska
Atka
Alaska Pen.
Dutch Harbor
Umnak
Annette Island
Paramushiro
Amchitka
Adak
0
500
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Scale-Miles
Seattle
U. S. A.
PACIFIC OCEAN

The north road to Tokyo follows the Alaska Peninsula and the curving chain of the Aleutian Islands. The Jap base at Paramushiro has been bombed.

n Umnak we continued to move rd with the Aleutian defense. xt stop, Aug. 31, 1942, was at destined to become the center tian activities. A month later pped back to Atka to build an ediate airport. On Jan. 12, the first major move to drive emy off the islands was made nding at Amchitka Island, only es southeast of Jap-held Kiska. the Adak and Amchitka strips ompleted planes for these bases atically bombed Kiska and Our successful invasion of Attu l May 11, 1943 (*ENR* Dec. 30, vol. p. 492). The taking of Attu ompletion of an airport there tted our forces to squeeze Kiska two directions. Such pressure e too hot for the Japs on Kiska, hey evacuated the island a few prior to our invasion on Aug. 943, bringing to a close the s to clear the enemy from the ians. So much for a brief resume e tactical operations.

Pierced plank paving

e Seabeas helped build the Um-irport, and are working with the on a landing field at Attu, to be jointly by the army and navy. here in the western Aleutians irports are being built by army eer troops.

e material alone made possible st construction of these outpost airports—steel mat surfacing. Several types of steel mat have been developed but that known as pierced plank has been found most suitable for Aleutian conditions. This type consists of steel sheets about ⅛ in. thick, 16 in. wide and 10 ft. long, pierced by three rows of cupped holes 3 in. in diameter, stiffened with two longitudinal ribs pressed into the plate, and fringed with a series of slots and bayonet hooks, the latter bent downward at a 45-deg. angle. These hooks engage the slots of adjacent sheets when over lapped about 1 in., forming a tight, smooth interlocked steel mat that is substantial and durable, well liked by the pilots because of its smoothness and because they can make belly landings on the mat in emergencies with a good chance of walking away from the disabled ship.

The sheets weigh 65 lb. apiece, (easily handled by two men) or 5.2 lb. per sq. ft. in place on the field. Usually the mat is laid on a sand base, for on most of the islands is found a fringe of dunes of volcanic sand which supply this needed material. In general, the sheets are laid transverse to the long axis of the runway with joints staggered. Staggering the joints leaves alternate rows of sheets either 5 ft. too long or two short. Usually each shipment includes a number of half-length sheets to fill

Steel plank runway surfacing is laid in fast time by experienced engineer troops using only simple tools.

Timber tide gate keeps out the sea at high tide, drains off the dike-enclosed field at low tide for an unusual airport on Adak.

Water within the dike-enclosed field is kept under control by three pumps like this one, powered by diesel engines.

in at the ends to make a straight line edge on both sides, but sometimes the short sheets are not available. The ragged edges invite wind erosion of the sand when the base material is unusually fine, so in some cases end filler sheets are made by cutting standard lengths in half with arc welders.

The sheets are overlapped in two different ways. One, known as the Venetian blind system, is to lay one edge on top of one adjoining sheet and under the sheet on the other side. The second method, called "over-and-under" is to lay alternating rows on top of both adjoining rows. Experience proved the best method is to lay the ends of the runways, where planes land and take off, and traffic is predominantly in one direction, by the Venetian blind system with the high side toward midfield, and to lay the center section over-and-under for two way traffic. After the bayonet hooks are inserted into the slots of the adjacent sheets the newly-laid steel plank is shoved endwise to fully engage the hooks. Two spring clips are then pounded into two slots in each sheet to keep the hooks from backing out.

At one runway the Air Corps requested the sheets be laid longitudinally with the idea that perhaps the surfacing would be smoother for small planes. However, the big bombers caused the sheets laid in this ma to warp and buckle, so it was ne sary to tear up the runway and re the plank transversely, after which further trouble was experienced.

The sand base, built with scrap and bulldozers, is leveled off dragging with scrapers when material is dry, by road graders wh wet, followed in each case dragging with timbers pulled by tr tors. Final finishing, just ahead laying the steel sheets, is by ha shovels and rakes. After laying, holes in the steel plank are filled in spreading sand over the mat w hand shovels. Excess sand on the s face soon works down through steel to fill up local low spots or blo away. A transverse crown of 1½ p cent is carried from the edges tow the center of the strip. Experience h shown that the sand subgrade wh graded on straight slopes to an ap at center of runway settles into a d sired curved crown within a few da under traffic.

Umnak alone proved the worth steel mat surfacing even if anoth field had never been built in t Aleutians. When the Japs were thre ening to invade Alaska and the islan in 1942 the engineers were worki fast to get the airfield at this site co pleted for the protection of Dut Harbor. Time was short, so instead grading up the usual sand base th engineers laid the pierced plank m directly on the tundra, that grass-co ered swampy ground that covers of the Aleutians. Their judgment an speed paid off in big dividends, fo within a few days after enough m had been laid to form a suitable lan ing strip for a fighter squadron th Japs attacked Dutch Harbor. O Umnak-based squadron took off fro the steel-paved swamp and went t work on the invading fleet. Takin advantage, as always, of local mat rials whenever possible, the Arm Engineers used a mountain of volcan cinders at Umnak for surfacing th permanent airport on that island.

Airport built in tidal swamp

At Adak, about two-thirds of th way out in the Aleutian chain, islands, one of the most amazing air ports in the world was built with re markable speed. Our troops made a amphibious landing on Adak a Sweeper Cove at the south end o Kulak Bay on Aug. 31, 1942. As i ays the case in the Aleutians, the step after landing was to build ight strip. There was no time for leisurely reconnaissance of the nd, no time for instrument sur- s, and after a 90 minute consulta- the engineers decided to place the landing strip in a tidal swamp.

he site selected was Sweeper Val- , about 4 miles long lying parallel the west shore of the bay, sepa- d from the sea by a low ridge of d hills. Bounding the valley to the t is a range of foothills that break k into high mountains. Sweeper ek, draining these mountains, en- the valley from the west about dpoint and meanders south to the through a tidal swamp that was oded 5 ft. deep at every high tide.

While Sweeper Valley was open to sea at both ends, drainage in gen- l was toward the south end, and south part of the valley was ected as the site for the first emer- ncy runway. The swampy valley or lay between El. —1.5 at the ore line to El. 3.5 at midpoint.

Airport in four days

The engineers first threw up a mporary dike with bulldozers along west, south and north boundaries the site, shoving the creek to the st, outside of the dikes. A ditch was t, with a road grader, along the nd hills to the east to drain the area thin the dikes. During high tides, ich reached El. 5, the area was rrounded by water on three sides; at low tide the south dike was breached with a bulldozer permitting water which had filtered in at high tide to run off through the east ditch.

Armed with bulldozers and tractor-hauled scrapers, the engineers moved some of the sand dunes into the swampy areas of the proposed field and filled in the original creek bed. When drained of its water cover, the northern part of the area was found to consist of hard-packed sand that proved an excellent temporary runway when simply dragged and leveled off. Steel plank was hurriedly laid on the fresh sand fill section, and in four days after the original landing was made in assault boats the engineers had completed a strip long enough for a bomber to land.

After the first rush was over, a more substantial landing strip was built parallel to and west of the original strip. Here, also, the south end of the runway was sand fill, surfaced with steel plank, while the north end was merely the original sand bottom of the valley leveled off with timber drags. Another inside drainage ditch was dug between the new strip and the west dike. A new and higher sand dike was placed across the south end of the area. Included with construction of the second runway were taxiways and hardstandings (paved areas for parking planes) to form a complete airport.

To eliminate the necessity of breaching the south dike at every low tide to drain the enclosed area, the engineers built a tide gate consisting of several box culverts fitted with sliding gates. These washed out, however, so new tide gates were installed by driving a substantial pile trestle the length of the desired opening, then placing vertical sliding gates on both sides, operated by hand chain hoists, in guides fastened to the piling. These gates seat in a solid timber wall and have proved very satisfactory.

The two inside drainage ditches were connected at the south end, near the tide gates. To keep the water within the enclosed area under control at all times, three pumps with a combined capacity of 10,000 g.p.m. were installed to lift the accumulated water over the west dike in the creek. Except in extremely wet weather, one 1,100-g.p.m. pump can handle all the infiltration. During the infrequent spells of dry weather the water level in the ditches is deliberately kept high to moisten the sand base of the runway, thus reducing blowing of the sand under high winds.

The new airport was still vulnerable to flooding from the hills to the west, so a whole new dike was built for two miles along the west side by bulldozers, scrapers and draglines. The overlying tundra peat was used as a core, covered with sand. This new dike was carried to El. 9, to withstand a flood superimposed on a high tide. It was made 24 ft. wide on top to serve as a roadway. Sweeper Creek was then diverted to the bay to the north through a 700-ft. intercepting

e of the difficulties in building airports in the Aleutians is finding a level spot. At one island it was necessary to ild a sand fill 50 ft. high, drained by a big wood-box culvert, to carry one end of the runway.

A lake had to be drained and the soft, soupy bottom material removed with a dragline before a runway could be built at one Aleutian island.

canal and through a ditch formed by the borrow pit of a 1,400-ft. extension of the new west dike.

The march continued westward. Next to be established as a main airbase was Amchitka, lying only 65 mi. east of Jap-held Kiska. Here the initial landing was Jan. 12, 1943, and the engineering forces, landing with the task force, jumped right into airport construction. Again a tide-swept, low-lying valley, much narrower and smaller than the one at Adak, was selected for the first runway site. A sand fill raised the lower end of the valley above tidewater level. Because this base was within easy bombing range of Kiska enemy bomber raids interfered with rapid construction, so it took about a month to get the first strip built and ready for operation.

Plank only at runway ends

A new system of runway surfacing was tried here, consisting of pierced plank steel surfacing at the ends of the landing strip where planes take off and land, and a sand section in the center stabilized with calcium chloride to make it firm and solid. Several members of the engineer forces lost their lives in Jap bomb raids while building this field.

After the first strip was completed, permitting the basing of a fighter squadron, the next attack by Japanese planes was beaten off and the Japs never came back for more.

Working under protection of a fighter squadron at Amchitka, the engineers built two more strips on another location suitable for bomber operations. The longer one of these was surfaced entirely with steel plank but the shorter cross runway was built with steel mat only at the ends, where the planes landed and the center was surfaced with crushed rock. Fortunately, Amchitka offers excellent rock beneath its cover of tundra so a quarry was quickly opened for supplying rock for runways and roads.

We hammered Kiska repeatedly in bombing raids from nearby Amchitka, and then on May 11, 1943 pulled a surprise move by making an end run instead of a center rush and invaded Attu, the last island in the chain the other side of Kiska. Here again we rapidly built another steel-paved step on the springboard to Tokyo. In short order, the engineers with heavy grading equipment created a suitable runway fill, while slapping the steel mat in place was only a matter of hours.

Details of construction and design, dimensions and exact locations of many of the air bases cannot be revealed at this time. Still, enough has been pointed out to indicate that despite rugged terrain, soft ground, wretched weather and the supply problem, our steel-paved steps to Tokyo represent a construction achievement of note.

Baltimore Collects Union Dues of Public Works Employes

An unusual system under which Baltimore collects union dues of per diem employes of the municipal public works department and turns the money directly over to the labor union now is in effect. The union pays the city costs of collecting the dues, the International City Managers Association reports.

A new agreement, drawn up to eliminate the court's objections to a former similar contract between the city and the union, recognizes the union as the sole bargaining agency for all employes as a group but does not deny the right of individuals to bargain with the municipality. The city collects union dues as a salary deduction when requested by the employe; the union reimburses the city for any additional accounting expenses incurred in making the deduction from the payroll.

Machinery for arbitration of disputes is set up, but the authority of the department head to settle grievances and to hire and fire employes is recognized. The closed shop and the right to strike are outlawed specifically in the contract. An interim court opinion held this contract "not invalid on its face." A taxpayers' suit challenging the authority of the city to deduct dues for the union still is pending in court.

The first payment made to the union amounted to $5,593 and was for dues of 829 workers from April 8 to June 30 and covered advance dues to July 31. By June 30 the city's central pay-roll had collected union dues totaling $11,020. However, the court ordered the portion of this amount collected under the original agreement refunded to workers.

Dues collected after April 7 under terms of the new agreement were paid the union. Collections from all workers authorizing the $2 monthly deductions cost the city approximately $6 which has been refunded to the city's pay-roll bureau by the union.

Long Span Laminated Timber Arches For an Aircraft Hangar

Alfred Zweig
Structural Engineer
Albert Kahn Associated Architects & Engineers, Inc., Detroit, Mich.

***ntents in Brief**—Three-hinged laminated arch ribs of 7½x36-in. cross-tion and 171-ft. span serve as the principal framing for a timber aircraft gar. A horizontal overhead truss of 20-ft. depth and spanning the full dth of the hangar at the front end accommodates the wind loads on both ds of the structure. The door leaves of the main opening operate at the p in timber guides that may be adjusted if necessary to accommodate anges due to shrinkage of the timber framework.*

AIRCRAFT HANGAR of timber con- ction at Hagerstown, Md., claims ention because of the long span h ribs employed, the procedure llowed in designing the arches, and method employed to accommo- te wind loads on the ends of the ucture.

The hangar is 171 ft. wide, 120 ft. g, and 48 ft. high inside. A 21-ft. de two-story lean-to along one side ovides space for repair shops and ices, but reduces the effective in- de width to 150 ft. Wooden doors lling back into pylons at the sides ovide a 27 x 135-ft. clear opening at front end of the structure.

Since the headroom at the sides of the hangar would have been reduced too much, the most economic curve of an arch—a parabola—could not be used in laying out the arch ribs. Instead, the arches, which are on 10-ft. centers, follow the outline of a three-centered circle, in consequence of which a bending moment of 245,000 ft.-lb. is developed about 14 ft. from the supports. In accordance with War Production Board regulations, the arch was designed for 75 percent of the normal snow load of 30 lb. per sq. ft., which resulted in a total uniform design load of 480 lb. per lin. ft. of arch rib.

The typical rib was detailed as a three-hinged arch of 7½ x 36-in. uniform section. Kiln-dried, glued laminated timber was specified to accommodate the high stresses deemed advisable. A basic stress of 2,333 psi. for combined bending and compression was permitted by the specifications of the Forest Products Laboratory, U. S. Department of Agriculture (Technical Bulletin 191); when this basic value was modified by the so-called "depth factor," the permissible stress was close to 2,000 psi.

Arches all of same design

Carrying a horizontal wind truss and the door guides, the two front arches of the hangar were designed for a total uniform load of 800 lb. per ft., or almost twice the loading of the typical arch. Instead of using arches of greater cross section to accommodate the increased load, a horizontal 6 x 8-in. wood tie about 29 ft. above floor level was provided in the vertical plane of each of these two members. By means of these ties it was possible to use the typical arches

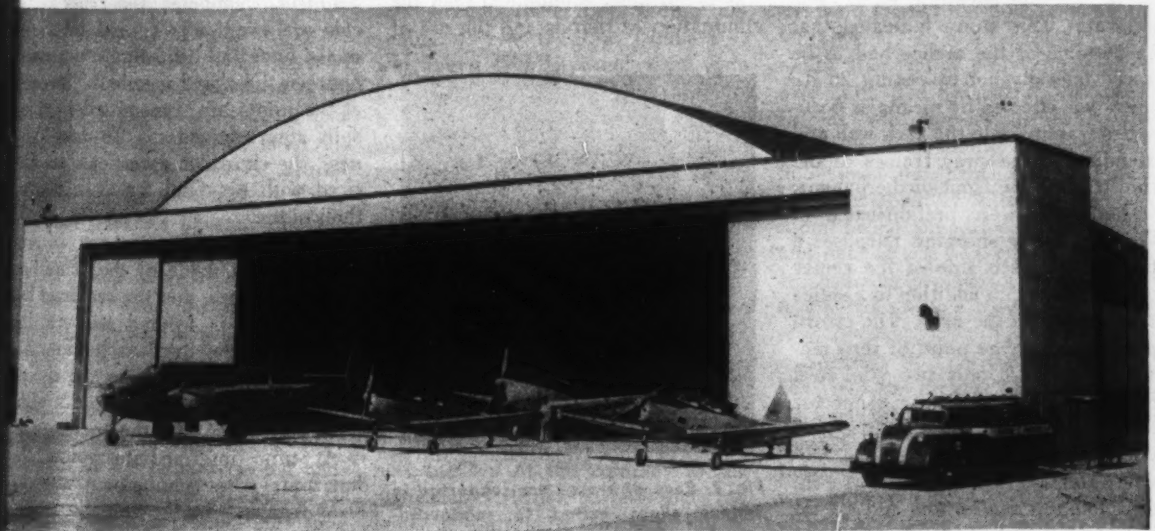


Fig. 1. Principal framing of this timber hangar consists of laminated arches of 171-ft. span on 10-ft. centers.

Fig. 2. Wind loads on both ends of the hangar are resisted by a rigid horizontal truss at the open end of the structure. The truss is supported at frequent intervals by sway frames attached to the two end arches.

throughout, and thereby simplify construction. Designed for a tension load of 45,000 lb. each, the ties are at the level of the wind truss and do not reduce the overhead clearance.

Of interest is the fact that the moments in the arches all are negative, making the bottom and not the top of the arch in compression for its entire length. As a result, a careful investigation of the buckling effect was necessary. This study indicated that the bottoms of the arches had to be braced laterally not exceeding 28 ft., which was effected by means of 6 x 6-in. ties framing into the back wall and extending to the sway frames of the wind truss at the front of the hangar.

The arches were prefabricated in Wisconsin. For shipping purposes a splice 30 ft. each side of the center was introduced, in addition to a splice at the crown of the arch. The crown splice, being at the point of zero moment, consists of only two ⅜-in. steel side plates with six shear connector rings on each side, while the two side splices, which had to develop a moment of 63,000 ft.-lb., consists of ⅜-in. steel plate top and bottom and a ⅜-in. steel plate at each side lag screwed to the arch.

The horizontal thrust of the typical rib is 37,000 lb. By using three 1-in. round tierods between the two footings of each arch, reinforced footings of only 3 ft. by 4 ft. 6 in. mat area were of sufficient size to support the arch ribs. The ties are welded at the splices and are protected against corrosion by being embedded in the concrete floor slab. This arrangement was found more economical than the elimination of tierods and the use of footings designed to resist the horizontal thrust.

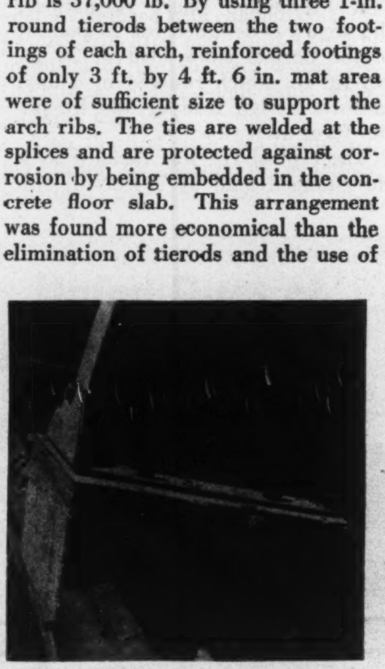


Fig. 3. Ends of arches are supported in welded shoes bolted to reinforced-concrete footings joined by tiebars embedded in the concrete floor.

The horizontal wind truss at the front of the hangar spans 171 ft. and is 20 ft. deep It is designed for a total wind load of 66,000 lb., which results in chord stresses close to 90,000 lb., and about half this stress in the end diagonals. The chords consist of two 2 x 14-in. timbers and two 3 x 14-in. members; the truss verticals are two 3 x 14's; and the diagonals one 3x 14-in. timber inserted between the chord members. Stresses at the joints are transmitted by 4-in. split ring connectors. To add stiffness, the chords and verticals are latticed with diagonal 2 x 4's nailed to their sides.

The center of one chord is projected 5 ft. outside of the centerline of the first arch, and the center of the other chord is located between the second and the third arch (Fig. 4). This arrangement enables the chords to pass to the outside supports without interference with the arches.

At nine intermediate points the horizontal truss is hung or strutted by sway frames from the first and second arches. The verticals of the truss form the bottom of the sway frames

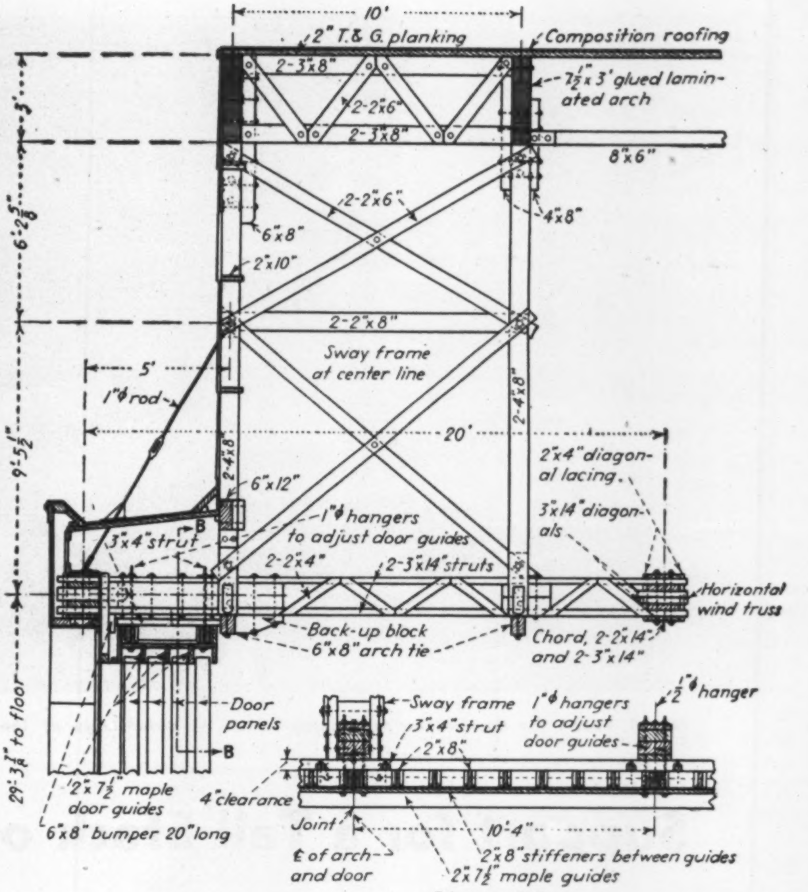

10'
2" T.& G. planking
Composition roofing
2-3"x8"
2-2"x6"
2-3"x8"
7½x 3' glued laminated arch
8"x6"
3'
6'-2⅝"
2-2"x6"
4"x8"
6"x8"
2"x10"
2-2"x8"
Sway frame at center line
5'
1"ϕ rod
20'
2-4"x8"
2-4"x8"
9'-5½"
2"x4" diagonal lacing.
3"x14" diagonals
6"x12"
1"ϕ hangers to adjust door guides
B
3"x4" strut
2-2"x4"
2-3"x14" struts
Horizontal wind truss
Back-up block
6"x8" arch tie
Chord, 2-2"x14" and 2-3"x14"
29'-3⅛" to floor
Door panels
B
2"x7½" maple door guides
6"x8" bumper 20" long
4" clearance
Sway frame
3"x4" strut
2"x8"
1"ϕ hangers to adjust door guides
½"ϕ hanger
Joint
10'-4"
℄ of arch and door
2"x8" stiffeners between guides
2"x7½" maple guides
Section B-B

Fig. 4. Guides at the top of the door leaves at front of hangar are suspended from the horizontal wind truss, which projects about 6 ft. beyond the end arch rib. If necessary, due to shrinkage of timber or for other reasons, the bolts supporting guides may be tightened to provide more space above doors.

support the top guides of the ng doors. Two heavy vertical X ces in the outside wall of the door ns support the ends of the truss transfer the wind load from the into the footings.

he top door guides are made of 7½-in. maple strips bolted to a ne consisting of two 2x8-in. rds on each side and a plywood om stiffened by 2x8-in. joists 16 on centers and perpendicular to guide strips (Fig. 4). The ma- strips are laterally stiffened by 8-in. boards glued to the plywood tom. These frames, which were fabricated in lengths corresponding to the distance between truss ver- ls, are connected to the verticals 1-in. dia. hanger rods, a vertical arance of 4 in. between the truss the frames being provided.

Guides are adjustable

Since the top of the hangar rods readily accessible, it will be pos- le to raise and adjust the guides turning the nuts, in case the roof gs slightly due to shrinkage of the od or from other reasons. It is t that this arrangement, together th the turnbuckles provided in the ngar rods supporting the outside ord of the wind truss at the five ay frames, provides sufficient ad- stment to guarantee satisfactory or operation.

To transmit the wind-load from the or guide panels to the wind truss, x4-in. timber struts were fastened the guide frames after their erec- on. These struts fit tightly between e 6x8-in. arch tie and the short x 8-in. bumper pieces bolted to the uss verticals close to the truss ord. To secure a safe load transmis- on the tie is backed up with bumper eces at the truss verticals (Fig. 4).

The door panels—of 6-in. overall ickness — consist of glued lami- ted wood frames covered on both des with plywood. Hand operated, e door panels move on steel rails at or level; at the top the panels are uipped with lateral rollers moving ong the door guides. During a full ar of operation the doors have used no trouble.

No arch is used in the plane of the ck wall of the hangar, which con- ins wooden columns spaced 12 to l ft. apart and carrying light roof eams and the wall framing. In view f the maximum height of 48 ft., built-up columns were used instead of solid sections, the highest column consisting of two 8x10-in. timbers to which two ½-in. plywood webs were glued—one on each side—to form a box-like section 3 ft. 6 in. deep. The shorter columns are correspondingly reduced in size.

The wall framing consists of horizontal 2x8-in. timbers or 2x10's, depending upon the span, spaced about 4 ft. on centers. Between these girts 2x4-in. studs on 16-in. centers are used. The covering for the end wall is the same as on the side walls, consisting of ¼-in. asbestos siding nailed over ¾-in. insulation sheathing.

Horizontal box-like beams connect the top of the columns to the nearest arch, which permits the wind loads at the top of the back wall to be transmitted to that rib and forward to the horizontal wind truss at the front. In this way the truss takes the wind loads from both ends of the building.

For the roof a 3-ply composition over 2-in. T&G planking was used. On the side opposite the lean-to the roof does not follow the arches to floor level but turns outward at a height of about 17 ft. to rest on horizontal beams supported by the arches and outside 2 x 6-in. stud walls. This arrangement provides a maximum of usable floor space between the arch ribs.

Norman J. Early, Hagerstown, Md., was the general contractor. All the structural members were fabricated by Unit Structures, Inc., Peshtigo, Wis. Plans and specifications were prepared by Albert Kahn Associated Architects & Engineers, Inc., Detroit, Mich. The owner is the Fairchild Engine & Airplane Corp.

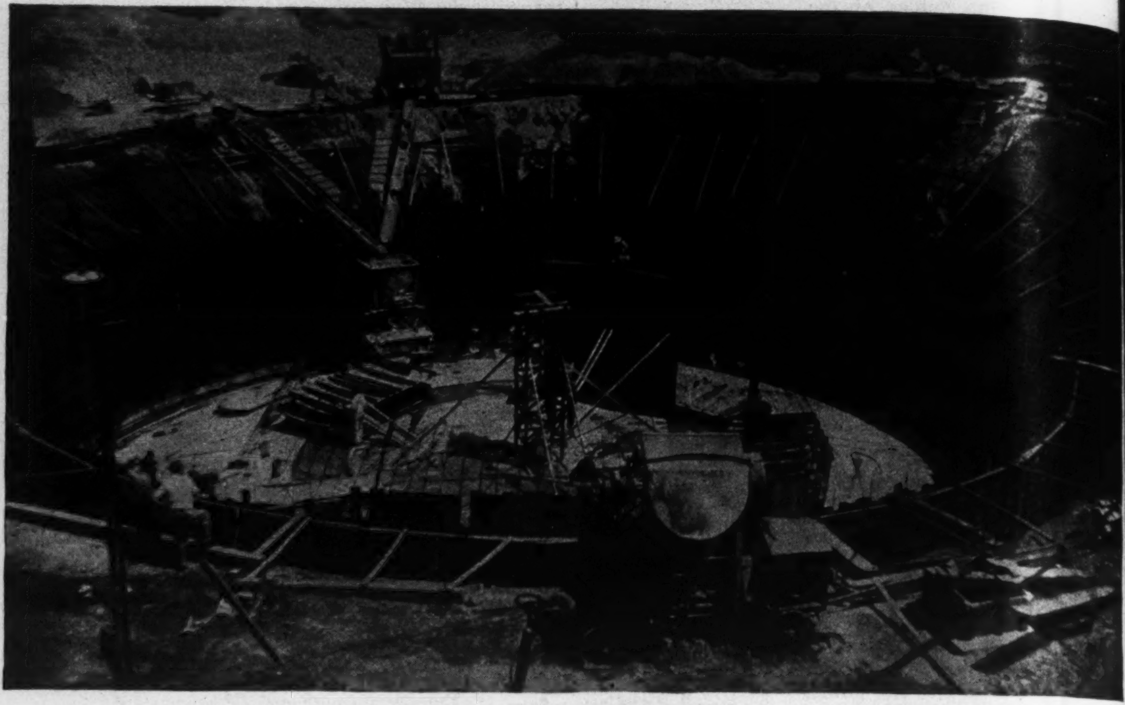


Fig. 1. Forms for the circular wall being set at the outer edge of the spread footing of the stack.

Support for a Tall Stack on Poor Soil

Clarence W. Dunham

Structural Engineer, Phelps Dodge Corp., and
Associate Professor of Civil Engineering, Yale University

Contents in Brief*—The foundation materials under a 540-ft. reinforced-concrete stack were of such unstable nature as to call for a floating foundation and for equalization of the superimposed load by removal of the overburden. Acid-bearing groundwater also complicated the foundation problem. The completed foundation consists of a heavily reinforced concrete slab at the bottom of a large shallow well formed by a wall at the outer rim of the circular spread footing. Membrane waterproofing protects the whole structure against attack by the acid water.*

UNUSUAL CONDITIONS sometimes lead to unusual remedies. This is exemplified in the design of the foundation of the 540-ft. reinforced-concrete stack that serves the roasters and the reverberatory furnaces of the Copper Queen Smelter of the Phelps Dodge Corporation at Douglas, Ariz. The completed stack is founded upon numerous strata of sands, clays, silts and gravels which, as reported from local well-drilling operations, extend to a depth of at least 1,000 ft. Some of those within the zone of high foundation pressures were of such low bearing value as to result in a foundation design of unusual character. This design combines a spread footing of sufficient area to insure against unequal settlement due to variations in the character of the soil on which it rests and removal of enough overburden to about equalize the load that the stack would otherwise have placed on the deeper beds of soft clay. Acid-bearing groundwater added to the design complications.

The new stack replaces two 300-ft. steel stacks located about 620 ft. apart, which were in such bad condition as to call for early replacement to prevent interruption of the flow of copper to war industries. Local conditions fixed the best location for the new stack at some point about midway between them. The height of the new stack, in turn, was fixed by Arizona authorities, who insisted that any new stack be practically as high as the 565-ft. stack built in 1941 to serve the converters at the smelter. That stack is 440 ft. from the new one and on somewhat lower ground. It is founded on a lense of gravel that is partially cemented together, forming caliche or a sort of weak conglomerate. No trouble was experienced during its construction, and none has developed subsequently.

Exploration of the site for the new stack was begun in 1941. Three fts were dug through the 20-ft. r of slag overlying the natural und and about 10 ft. into the ural soil. Two borings also were le with a well-drilling outfit. No sturbed samples were taken. The ings are shown in Fig. 3a. Con- rable water containing sulphuric l and copper sulfate was found the slag just above the adobe, reas the groundwater below this be was pure.

Initial foundation studies

No lense of gravel comparable to t supporting the other large stack s found. Consequently, the first ndation design to be studied was lain concrete mat 4 to 6 ft. thick ced directly on the adobe. By ilding the spread footing of the ck on top of this, the former uld be raised above the ground- ter level where the concrete and inforcing steel would not be sub- t to attack from the acid water. owever, a load test on this adobe oved it to be unsatisfactory as the aterial was wet and plastic and owed out from under the bearing ate. This indicated that the hoped- r bearing resistance of 3 tons per . ft. could not be attained.

On this account a pile foundation as studied next, using about 570 ncrete piles 30 ft. long with an sumed safe load of 30 tons each. this case the base was to be raised bout 10 ft. above the top of the dobe to get it out of danger from e acid-bearing water. The tips of e piles were to penetrate to about l. +5 (Fig. 3a). When a cross- ction of this pile design was drawn show the entire stack, the soil rata and the relatively "tiny" piles scale, it became evident at once at the piles would do little good ecause they would merely deliver eir loads to the tapered clay strata.

A glance at Fig. 3a shows that ompression of the varying thick- esses of these clay layers would lmost inevitably cause unequal ettlements, which would in turn ause tipping of the stack. Inasmuch s the motion of the top would be bout seven times as great as the ifferential settlement of opposite dges of the footing, it was deemed dvisable to reexplore the soils be- ore deciding upon the design of the tructure. Furthermore, the informa- ion shown in Fig. 3a did not seem to be a natural, reasonable condition. Even if it proved to be correct, the characteristics of the soils—particularly the clays—should be ascertained because, if they were highly compressible, and if the strata were tapered and deep, it would be almost impossible to prevent serious tilting of the structure.

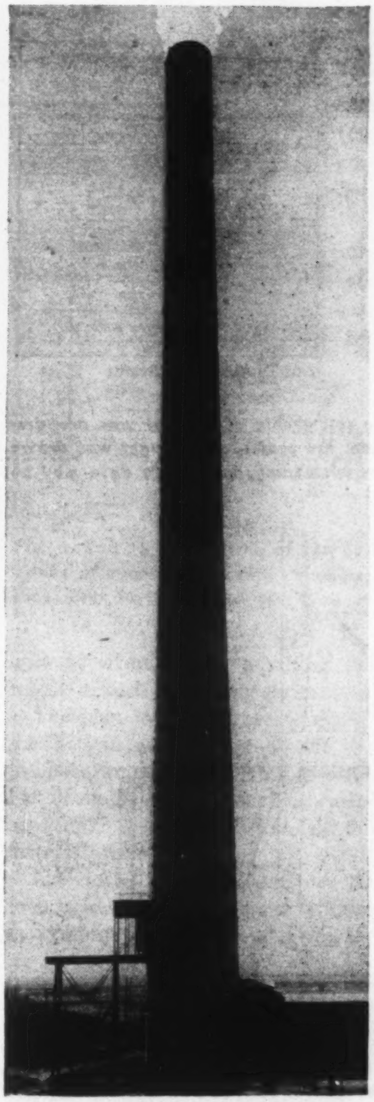


Fig. 2. Towering 540 ft. above the top of its base and supported on a low-bearing soil, this stack required extensive foundation studies before a satisfactory method of support was chosen.

New borings taken

To gain more complete knowledge of the soil conditions, four new borings were made about 35 ft. from the proposed center for the stack and roughly at the quarter points around the circle. Two others were taken, one about 100 ft. east and another 75 ft. to the southeast of the center of the site.

These soil samples were tested in the soils laboratory at Yale University.

A north-south profile plotted from the log of the new borings is shown in Fig. 3b. It indicates that the strata are not tapered as shown in Fig. 3a.

The log of the borings east and southeast of the desired site indicated that nothing was to be gained by shifting the stack in that general direction.

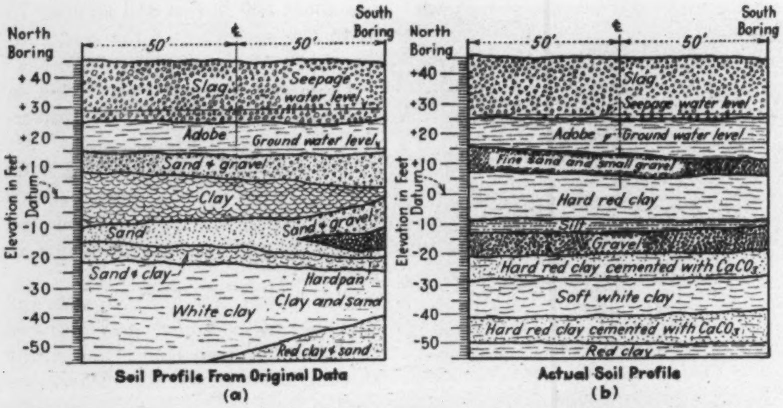
For about 30 ft. below the adobe the various strata proved to be reasonably firm and relatively incompressible; furthermore, the two layers of red clay were quite impervious. The top stratum of sand and gravel consisted largely of fines with some clay and small pebbles. All these strata together formed a sort of earthen slab over 30 ft. thick, which seemed to be fairly strong and reliable in its natural, undisturbed state. However, under these strata the 10-ft. layer of soft, whitish clay had a consistency and appearance approaching that of well-mixed putty. Its moisture content exceeded 30 percent, and its bearing value was of low order unless fully restrained.

Although the strata below this white clay were strong, they were so deep that piles long enough to reach them would be needlessly expensive. Hence, the idea of using piles was abandoned and study was concentrated on some form of floating foundation that would disturb the natural soil conditions as little as possible.

Floating foundation studied

In the initial study for this floating foundation the bottom of the spread footing was located on the first bed of sand and gravel at about El. +13 (Fig. 3b).

Inasmuch as the 20-ft. layer of slag on the surface of the natural ground had been in place for many years, it seemed probable that appreciable settlement of the underlying strata due to this surcharge had ceased, and that the slag itself would also be useful as a blanket in preventing flow of any plastic soils from underneath the structure. Moreover, the soil tests seemed to show that the materials just under the adobe could


North Boring
South Boring
50'
℄
50'
+40
+30
+20
+10
0
-10
-20
-30
-40
-50
Elevation in Feet
Datum
Slag
Seepage water level
Adobe
Ground water level
Sand + gravel
Clay
Sand
Sand + gravel
Sand + clay
Hardpan
White clay
Clay and sand
Red clay + sand
Slag
Seepage water level
Adobe
Ground water level
Fine sand and small gravel
Hard red clay
Silt
Gravel
Hard red clay cemented with CaCO₃
Soft white clay
Hard red clay cemented with CaCO₃
Red clay

Soil Profile From Original Data
(a)

Actual Soil Profile
(b)

Fig. 3. Based upon the original borings the soil profile at the left was prepared Later, after four new borings had been made, the profile at the right was drawn. Comparison of the two profiles shows how misleading inadequate data may be.

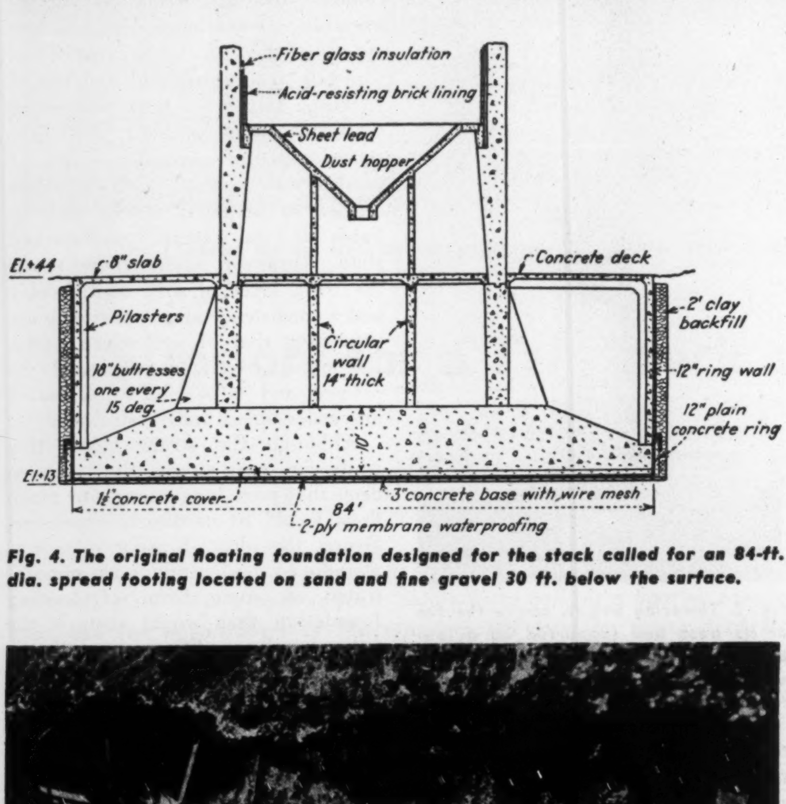

Fiber glass insulation
Acid-resisting brick lining
Sheet lead
Dust hopper
El.+44
8" slab
Concrete deck
Pilasters
2' clay backfill
Circular wall 14" thick
18" buttresses one every 15 deg.
12" ring wall
12" plain concrete ring
10'
El.+13
1½" concrete cover
3" concrete base with wire mesh
84'
2-ply membrane waterproofing

Fig. 4. The original floating foundation designed for the stack called for an 84-ft. dia. spread footing located on sand and fine gravel 30 ft. below the surface.

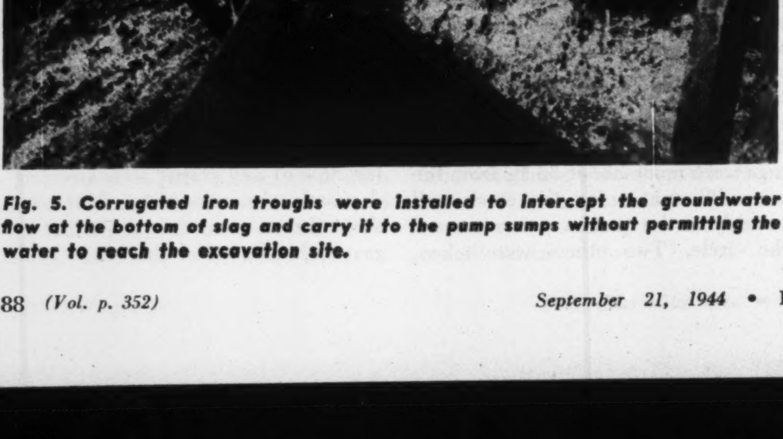


Fig. 5. Corrugated iron troughs were installed to intercept the groundwater flow at the bottom of slag and carry it to the pump sumps without permitting the water to reach the excavation site.

safely withstand a maximum pressure of 3.5 tons per sq. ft. at the edge of the base for a combination of dead load and a wind pressure of 30 lb. per sq. ft. of vertical projection of the stack, considering the beneficial effect of the heavy slag overburden.

The next thing to be determined was the diameter of the base, using this 3.5 tons per sq. ft. as the maximum permissible edge pressure. If the adobe and slag were to be backfilled over the spread footing, their weight necessitated a diameter of approximately 110 ft. to meet this condition. As such a large base would be costly, it was decided to eliminate this heavy, useless dead load of the backfill above the footing, supporting the surrounding soil by a circular concrete wall at the outer edge of the footing, as shown in Fig. 4.

The weight of the slag and adobe removed from above the plane of bearing at the bottom of the base would be nearly equal to the dead load of the entire structure, thus producing no material increase in pressure on the underlying strata. The effect of wind was considered to be so temporary, so variable in direction and so small in magnitude that the resulting inequalities of pressure would not cause the underlying materials to flow or permanently compress, because their impermeability, shearing strength and cohesive resistance were too great to permit relatively rapid changes.

The problem of protection against the acid-bearing groundwater was solved by using membrane waterproofing as illustrated in Fig. 4. If the chemicals attacked the concrete outside of the waterproofing it seemed that nothing worse could result than its conversion to a sort of sand and gravel layer still capable of transmitting the necessary pressures.

Design changed again

Work of completing the excavation was started in June, 1942. When the slag was practically all removed and some of the adobe had been excavated to about El. +17, groundwater began to soften the adobe so badly that the digging of two sumps just outside of the future rim of the base was started to permit pumping out the water as fast as it entered. By the time these sumps had been excavated to El. +14, the ground-

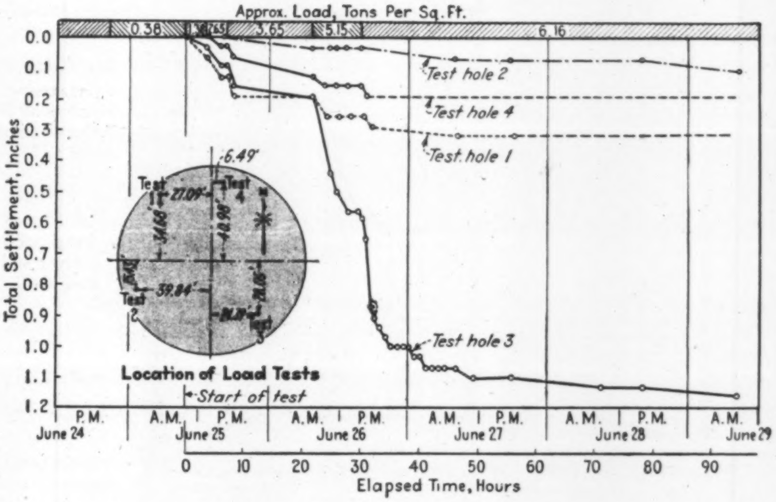


Fig. 6. Raising the bottom of the base 3 ft. required that the structure rest on adobe of uncertain bearing capacity, which made load tests of the adobe desirable. Four tests, spotted as shown at the left, supplied the data above.

ater below the adobe caused the ottoms to blow up and the water to se to about El. +15, which was 2 . above the proposed elevation of e bottom of the base. Fear of comlete disintegration of the bottom of e pit if carried to the intended eletion caused cessation of work.

The groundwater in the slag was heavily charged with acid that me had to be dumped in the sumps neutralize it and thus to avoid amage to the pumps.

The next problem was to intercept e groundwater at the bottom of the ag and to carry it to the sumps dictly without letting it reach the xcavated area. Although the slag as broken into small pieces, the articles seemed to be well interocked so as to give the slag layer onsiderable shearing strength. herefore, it was considered safe to ndermine the edge to permit installation of corrugated iron troughs to tercept the flow and carry it to the umps. These were successfully comleted (Fig. 5). As soon as the umps were again working, the process of drying up the excavation was arted.

Wellpoints considered

In the meantime, the elevation of e bottom of the base was tentatively rdered raised 3 ft. to El. +16, that eing slightly above the level reached y the groundwater rising in the umps, and just under the deepest art of the excavation already made. t was thought that the weight and npervious nature of the adobe would e sufficient to prevent blowing up f the bottom when the excavation to at depth was completed.

The use of well points to remove e groundwater from the top stratum f sand and small gravel shown in ig. 3b so that the base could be ept at its original elevation was onsidered, but the plan was abanoned for the following reasons: hat layer contained a large amount f very fine material that might be ashed out by the flow of water to e well points, the quantity of waer to be handled was completely unnown, and laboratory tests indiated that the action of the artesian ater was likely to disintegrate this yer seriously, the performance of e soil at the bottoms of the sumps eeming to substantiate this latter onclusion. Furthermore, it seemed wise to avoid doing anything that might disturb the lower strata.

The plan to raise the elevation of the bottom of the base meant that the base would have to rest on a few feet of adobe of questionable bearing capacity. Hence, load tests of this material were started.

Inasmuch as the design of the foundation was based upon utilizing the holding-down pressure of the materials outside of the footing itself, the tests were to take this feature into account. If they were made directly on the surface of the adobe, it seemed that such a plastic material would certainly flow out from under the loaded areas and that any such test would show far less applicable results than would a test made with some reasonable depth of material surrounding the loaded area.

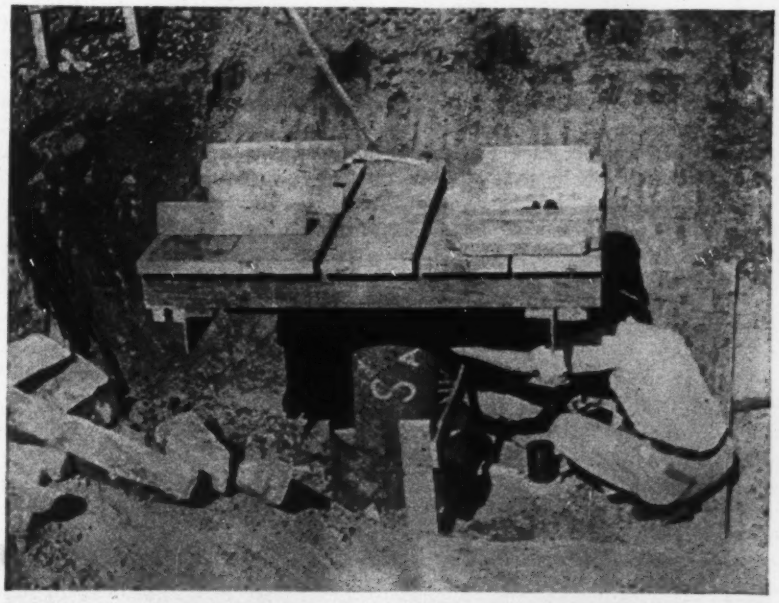


Fig. 7. To test the bearing value of the adobe, a circular plate having an area of 2 sq. ft. and surmounted by a 12-in. dia. pipe was placed inside a 20-in. pipe and loaded with pig lead. Settlement readings were taken before and immediately after the application of each load increment.

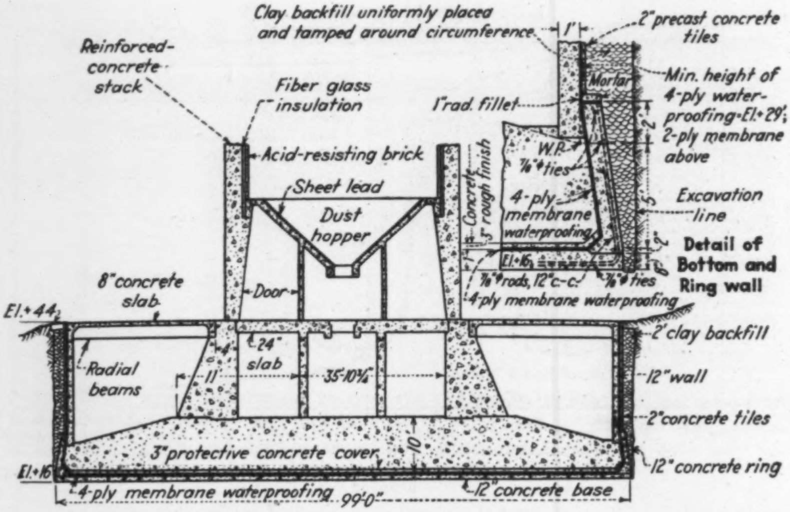

Clay backfill uniformly placed and tamped around circumference
1'
2" precast concrete tiles
Reinforced-concrete stack
Fiber glass insulation
1" rad. fillet
Mortar
Min. height of 4-ply waterproofing El.+29'; 2-ply membrane above
2'
Acid-resisting brick
W.P.
7/8"φ ties
Sheet lead
Concrete 5" rough finish
4-ply membrane waterproofing
5'
Excavation line
Dust hopper
El.+16
2'
Detail of Bottom and Ring wall
7/8"φ rods, 12" c.-c.
7/8"φ ties
6"
8" concrete slab
Door
4-ply membrane waterproofing
El.+44
2' clay backfill
4'
24" slab
Radial beams
11'
35'-10¼"
12" wall
2" concrete tiles
10'
3" protective concrete cover
El.+16
12" concrete ring
4-ply membrane waterproofing
99'-0"
12" concrete base

Fig. 8. Details of the foundation as finally constructed. This base was designed to support the stack without increasing the load on the supporting soil. Special care was taken to minimize possible damage to the concrete from the acid-bearing groundwater.

Therefore, the following procedure was adopted: (1) Make the tests so that the loaded area would be at El. +16, the assumed new elevation of the bottom of the concrete; (2) Test a loaded area of 2 sq. ft.; (3) Apply the load at the bottom of a hole 3 ft. deep below the adobe surrounding that vicinity; (4) Make four individual tests, locating them as near the quarter points of the pit's perimeter as possible under existing conditions; (5) Take load-settlement readings for all tests; (6) Assume that a settlement of one inch constituted failure of the soil; and (7) Allow sufficient time to assure that the settlements under each increment of load practically ceased before applying the next one.

The points for testing were chosen at the locations shown in Fig. 6. The immediate vicinity of each was leveled off at El. +19.

The plant engineers made the loading masts. Briefly, they consisted of a circular steel plate, 2 sq. ft. in area, at the bottom of a 12-in. steel pipe surmounted by a timber loading platform on a steel frame. The holes in which the tests were made were lined by sinking 20-in. steel pipes to the desired depth, after which the bottoms were smoothed off and a little dry sand sprinkled in and leveled. Loading masts were then erected, plumbed and rotated to get even bearing on the sand. Each mast was held vertically by installing six greased 2x4-in. wedges cut to proper size. These bore against the outer shell but did not hamper vertical motion of the mast.

In order to get settlement readings, a scale was attached to each mast, then a fine wire was stretched across two stakes and counter-weighted. To check the scale readings, and to avoid losing the value of a test in case something happened to the scale or wire, a hole was cut in the wooden platform so that a level rod could be set on the top of a cross-arm over the center of the mast.

The material encountered in the excavation of the test holes was about as follows:

No. 1: Adobe changing to a mixture of small, wet gravel and dark, coarse sand near the bottom of the hole.

No. 2: Reddish-soil, relatively dry and seeming to contain a sort of skeleton of cemented materials. It had hard spots and veins that appeared more whitish than the rest of the ground.

No. 3: Dense, dark red, plastic adobe for the full depth. The material was wet, but relatively impermeable. This soil was far softer than that encountered in the other holes.

No. 4: The bottom consisted of a mixture of red clay and coarse sand, but it was not as coarse and wet as the soil in No. 1.

When the test equipment was all set in place, an initial load of about 500 lb. per sq. ft. was applied, using pig lead as shown in Fig. 7. This load was allowed to remain all night to be sure that all slack was taken up. Thereafter, readings were taken just before and immediately after the application of each major increment of load.

Time-settlement curves for all of the tests are shown in Fig. 7. Test Pit No. 3 proved to be the critical one. The soil carried the load fairly well until it was increased to 5 tons per sq. ft., whereupon the adobe started to yield badly. Its settlement was recorded every two or three hours all through the following night. The other three test areas were later loaded to 6 tons per sq. ft. Although they held fairly well, it was evident that Test Pit No. 3, which represented the general condition along the east and south sides, would control the maximum allowable pressure

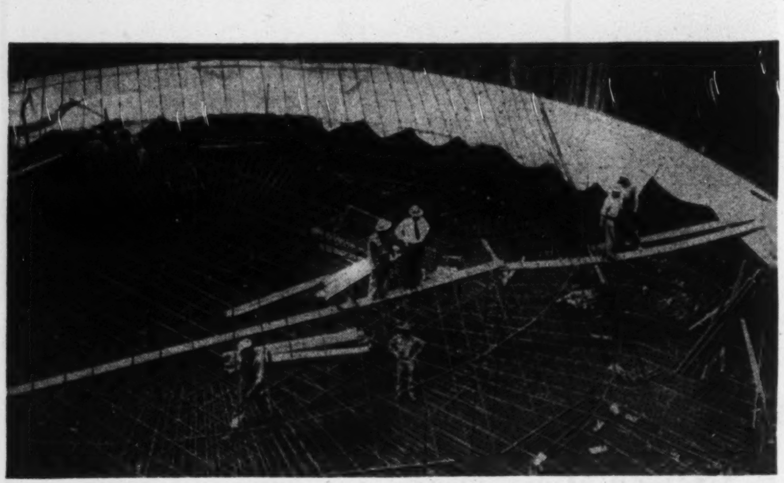


Fig. 9. The spread footing of the foundation is heavily reinforced, that for the bottom mat consisting of one layer of radial rods and four sets of parallel bars, 60 ft. wide, arranged at 45-deg. intersections.

be assumed in revising the design, ultimate load being taken as 5 ns per sq. ft. The test loads were ft on for another 48 hr., to make re that serious progressive settle- ents did not occur. Furthermore, ur additional test pits were dug to cate the full extent of the adobe at e elevation of the bottom of the se. In general, the results of the ld tests of the adobe were higher an those made in the laboratory.

Design again modified

The entire problem was now re- iewed. The urgency of the work, be- use of the dangerous condition of e reverberatory stack, and the ap- arent economy of the single stack, ade it seem advisable to modify the esign to make the structure safe at e chosen location. Of course, the istence of relatively firm materials one-half of the excavation, whereas e other half was weak and very astic, seemed to be just about as d a condition as one could find for e foundation of such a heavy, tall, ender structure. Obviously, the di- meter of the base should be in- eased.

The maximum allowable pressure r dead loads was assumed to be 2 ns per sq. ft. This was to be prac- cally the same as the estimated eight of the materials that would be moved above El. +16, the selected sition for the bottom of the base. he maximum allowable total pres- re under one edge of the base for ad load plus wind was set at 2¾ ns per sq. ft., giving a safety fac- r of nearly two with respect to the ilure of the soil under test.

Considering the fact that the di- meter of the existing excavation in e slag was about 100 ft., a total iameter of the base of 99 ft. was hosen, tentatively found to be satis- ctory, and approved as the starting oint for the new design. The final sult is shown in Fig. 8. Since the eight of the base would be about alf the total weight of the stack, it emed probable that this load would ke up a lot of the settlement due to compression of the soil if it tended rebound somewhat after the exca- ation was made and then to settle ain as the load was applied.

There was a real possibility that e almost vertical face of the adobe ould not continue to stand up un- r the slag if softened by groundwater or rain. Therefore, the concrete protection below the membrane waterproofing, and the ring wall outside of the edge of the footing were made heavy enough to form a strong "pan" at the bottom of the excavation. Once they were in, the bottom would be protected and the ring would help hold the adobe in place.

A detail of this very important feature is shown in Fig. 8. The ring was reinforced to act as a retaining wall; the edge of the slab also was reinforced so that it cantilevered beyond the edge of the heavy footing, thereby making the full 99-ft. diameter effective. The work was carried on in individual sectors in order to minimize the area exposed at any one time. After completion of the "pan", the greatest danger was over.

A few of the features shown in Fig. 8 should be noted. To reduce the cantilevered portion of the footing the lower part of the stack was belled out in a solid ring instead of using buttresses as in the early designs, the top of the belled portion being supported by a 24-in. concrete slab to resist the inward thrusts at the top. The "tank" wall was supported laterally by the concrete deck.

The membrane waterproofing of the "pan" was applied on the inside whereas that above the ring wall was placed after the completion of the concrete ring wall. The upper waterproofing was protected on the outside by large, precast concrete tiles, unreinforced and 2 in. thick, laid in mortar. The space between them and up to the face of the slag was backfilled with clay to minimize the penetration of water. A sump was built in the top of the footing in case leaks occurred. A manhole and ladder were provided to permit inspection.

After completion of the base, levels were taken once a month to ascertain what settlements occurred and whether or not they were uniform. The results to November 1943 show an average settlement of about ¼ in. The greatest differential settlement across the east-west diameter is ¼-in.

The tests of the soil samples and the interpretation of their significance were made by D. P. Krynine, research associate in soil mechanics at Yale University. In the planning and conduct of the testing and redesign work carried on at the plant in Douglas, the following men were of special assistance: Stewart Carpenter, general plant foreman, and E. C. Robinson of the Copper Queen Branch, Phelps Dodge Corp.; L. Clark Rankin, superintendent for the W. A. Bechtel Co., the contractors for the foundation; and Eric Plagwit and H. V. Arnold of the Rust Engineering Co., the contractors for the stack itself. In the engineering department of the Phelps Dodge Corp. at New York the writer was assisted by Arne Lier and Arthur L. Otto.

Garbage Disposal in Iowa Cities

A survey of garbage collection methods in Iowa cities over 20,000 population shows that all cities require householders to use more or less uniform water-tight containers of a specified type and size. However, methods of disposing of garbage vary widely, according to the American Municipal Association.

In Des Moines the department of streets collects garbage. The service is paid by special levy with no charge to the householder and the garbage is sold to hog feeders.

Seven separate contracts are let for garbage collection and financed by taxation in Sioux City. Garbage, rubbish and ashes are picked up from residences; hotels and restaurants, must remove their own. Davenport authorizes the department of public works to collect household garbage. Collections are financed by taxation, and the garbage is disposed of by the landfill method.

Cedar Rapids collections are made by department of health trucks and the garbage burned in an incinerator at the sewage disposal plant. The Dubuque contract also is let under supervision of the health department and financed by a special tax levy.

The Ottumwa sanitary department supervises the three private companies which make collections from residential areas at a charge of 50 cents a month.

In Clinton the city collects the garbage, financing the work by taxation. Method of disposal is by burning in incinerators. A private collector is used in Burlington. The service is financed by taxation, and the city sells the waste to hog dealers.

Fig. 1. Steep banks that offer little resistance to erosion were flattened as a preliminary to laying the revetment.

Revetting a River Bank at High Water

Contents in Brief—*Army Engineers perform emergency job of bank protection on the Mississippi River by sinking an articulated concrete mattress along the rapidly receding river bank. Abnormally high water and swift currents made the job difficult.*

ANOTHER ROUND HAS BEEN WON in the eternal battle to keep the Mississippi River within the confines of its levees. Its latest attempts to go meandering off from a prescribed course near Goodrich, La., was quickly checkmated when the Army Engineers stepped in and sank 3,000 lin. ft. of articulated concrete mattress along the threatened bank on the Louisiana side of the river.

Although bedeviled by high water and swift currents, the job was completed in 20 days, working two 10-hr. shifts per day. Spring rains along the river's upper tributaries had raised its crest 20 ft. above normal stage. Added to this, was the difficulty of battling an 8-ft. per sec. current. But in spite of these adverse conditions the river bank was graded to the proper slope and successfully blanketed with a protective layer of reinforced concrete revetment, the outer edge of which was submerged in 80 ft. of water.

Completion of this revetment work at Goodrich Landing affords protection for a controlling section of the main-line levee which sets back only 900 ft. from the river bank.

The trouble all started during low water last year when the Mississippi changed its natural course a short distance upstream. At the same time it brought great quantities of sand downstream to form a sand bar slightly upstream and across from the site of the revetment work. This decreased the effective channel section, increased the river's velocity and stepped up the rate at which the river bank was caving.

Another contributing factor to this excessive bank caving stems from the river's action some 2 or 3 miles upstream. By some freak of its channel-changing nature, the greater portion of the river started flowing to the right of a large island called Cottonwood Bar. This change in flow caused considerable recession of the right bank a short distance below the island.

From this point below Cottonwood Bar the river again formed a single channel which, aided by the newly formed sandbar, directed a severe attack against the right bank at the scene of revetment operation.

Original revetment lost

Within the past two years, the original revetment at Goodrich Landing was destroyed by the scouring action of the river. Also, a 1,000-ft. recession occurred in the west bank, with the last 500 ft. taking place in recent months.

The direction and magnitude of the scouring action gave every indication that the rapid recession of the west bank would continue, and at an increasing rate. Since there are only 900 ft. of foreshore between the levee and the river, the immediate installation of the articulated concrete mattress was considered imperative in order to protect the controlling levee at that point.

With speedy installation being of paramount importance, the revetment work was attacked simultaneously on two fronts, although at widely sep ted locations. While the caving er bank at Goodrich, some 30 mi. stream from Vicksburg, Miss., was ng graded and prepared to receive concrete mat, a huge government- ned casting plant at Greenville, ss., about 100 mi. upstream, was y casting the thousands of con- te blocks to form the articulated ttress. (For a full description of block casting and laying plant see R Dec. 25, 1930, p. 996.)

Casting the blocks

Concrete blocks for the articulated ttress were cast directly on barges shipment to the revetment site. ch block measures 14 in. wide, 3 thick and 4 ft. long. They were t in units of 20 blocks each. By ving a 1-in. crack between blocks ch unit has a laying area 25 ft. long d 4 ft. wide for a total of 100 sq. ft.

Blocks are not rigidly reinforced t they are tied together in pairs, th 0.18-in. dia. steel wire hoops. ds of hoops were left exposed for stening them with twist wires to nching cables anchored shore- rd and running between each row squares.

Casting the concrete blocks was on mass production basis due to well signed equipment and experienced erators. Speed of production in s operation was of the greatest portance since it was imperative t the concrete mattress be deliv- d at the job by the time grading erations were finished.

Blocks were poured in steel forms ectly on the barges. Forms were sened as soon as the concrete had en its initial set, and removed at end of 4 hours. They were then aned with wire brushes, sprayed th oil to prevent bonding to the ncrete, and placed on top of the viously poured blocks ready for next batch of concrete. Each er of blocks was covered with one ckness of heavy paper to prevent nding to the next concrete pour.

An average barge load contained 0 of the 100-sq. ft. units, totaling 00 concrete blocks. They were t in 20 stacks, each being 15 layers gh. Casting operations employed 0 men working one 10-hr. shift per y, 6 days a week. The entire revet- nt project required 9,560 of the 0-sq. ft. units or 32 barge loads. sting was started on March 10 and ished on March 22.

With the Mississippi River swollen to within a few feet of the top of its banks, most of the grading was subaqueous. In advance of this grading, a survey crew took soundings over the area to be revetted in order to establish a cut line far enough back from the river bank to give the desired slope for the mat.

This crew operated from a small motor boat and took soundings on circular arcs from established instrument points. By plotting this sounding data a clear picture was secured of the river bottom. Such a survey also was made on the sunken concrete mattress to insure its being properly placed.

Two draglines used

All grading of the river bank was by a dragline mounted on a barge and operating a 10-cu.yd. bottomless bucket on a 165-ft. aluminum alloy boom. The vertical river bank was cut down and wasted beneath the water to form a final surface over the entire revetment area, having a slope not steeper than 1 on 3. Usually it varied between 1 on 3 and 1 on 4.

Two grading units operated independently in order to speed the grading. The first one proceeded upstream rough-cutting the bank, followed by the second dragline which graded the river bank and subaqueous area to a final slope. Both machines operated in conjunction with mooring barges anchored shoreward by deadmen or to existing tree stumps. Roller attachments on the upstream ends of the barges on which the machines were mounted operated in rail runways on the mooring barges to guide the machines back and forth during grading operation, while at the same time remaining steady in the river current. Winches on the mooring barges operated the anchoring cables to move the entire plant upstream.

Prior to the start of grading, all interfering trees along the river bank were hand cut and removed from the area. As the normal bank-grading operations loosened a tree stump it was bulldozed away from the area with none being allowed to fall into the area to be revetted.

As the second dragline finished grading the bank to its final slope, a third boat equipped with a clamshell followed along and spread a

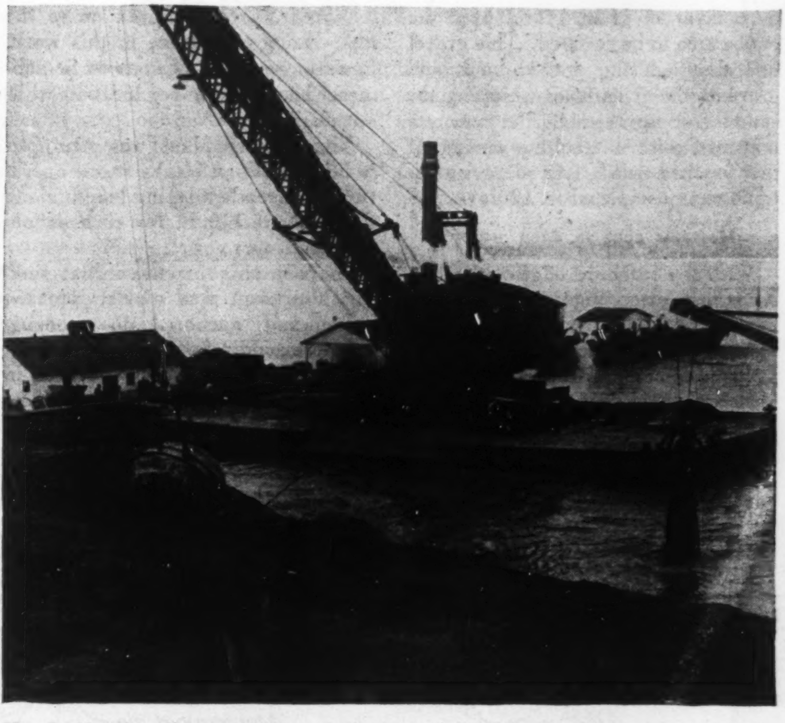


Fig. 2. Mooring barges, anchored shoreward, held the drag-line barge steady while it graded the bank to a gentle slope. At the right, gravel is being deposited on the new slope by a clam-shell bucket.

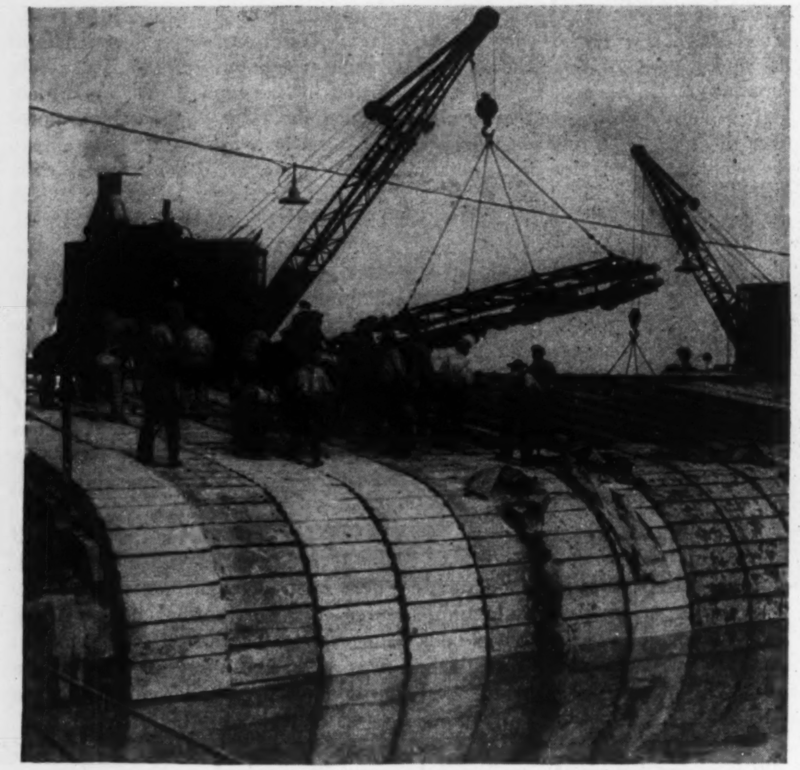


Fig. 3. Revolving cranes transferred sections of the concrete mattress from barges onto the deck of the sinking barge. Lifting-frames had 4-point pickups.

6-in. layer of river gravel over the entire area to be revetted. This gravel bed stabilizes the graded bank and prevents the river from whipping the sandy soil up through the concrete mattress, with a resulting caving of the finished work. Grading operations were completed in 12 days.

Mattress sunk in deep water

With the outboard edge of the concrete mat extending in some places 275 ft. out into the river and submerged in 80 ft. of water, the big problem of sinking was to prevent the upstream corner of each articulated section from rolling back on to the mat. Long experience in this work, however, enabled all mats to be submerged in their proper location without mishap.

The sinking plant was equipped to lay 35 rows of blocks at one operation. This made a laying length along the bank of 140 ft. for each articulated section.

In preparing for the initial sinking, the plant was moved into the shore and anchored to mooring barges extending out into the stream. These mooring barges were held in correct position and alignment by cables anchored either to deadme buried in the bank or to existing tre stumps. In some instances the mooring (or lining) barges are anchore upstream to landing barges which in turn, are anchored shoreward.

Typical sinking operation

After the sinking plant had bee properly located adjacent to th shore it was ready to form the firs mattress. Steel-beam launching arm were run out about 15 ft. over th edge of the sinking barge, nearl touching the graded bank. Revolving cranes on the stream side of th barge transferred the 100-sq. ft. sections of concrete blocks from ma barges onto the rear of the sinkin barge. This continued until 35 sections had been laid side by side extending the full length of the barg

To complete the assembly of thi initial 25-ft. width of articulate mattress, each protruding wire hoop embedded in the concrete blocks wa fastened with twisted wires to stee wire launching lines spaced 4 ft apart to lie between each line o blocks. The launching lines were securely anchored to deadmen in th river bank.

Transfer of the mat sections, totaling twenty of the 14-in. by 3-in. b 4-ft. blocks, from the mat barges onto the sinking barge was by a specia lifting frame using a 4-point pickup to the swinging boom. Vertical lug on the frame extend down to form pickup supports for each block.

The deck of the sinking barge is covered with continuous lines of rollers, with roller lines spaced 4 ft. c. to c. to support the concrete blocks. Tops of rollers, and the deck, slope downward toward the shore at 1 or 12 to facilitate launching of the mats.

To start the sinking of any articulated mat, the steel launching arms

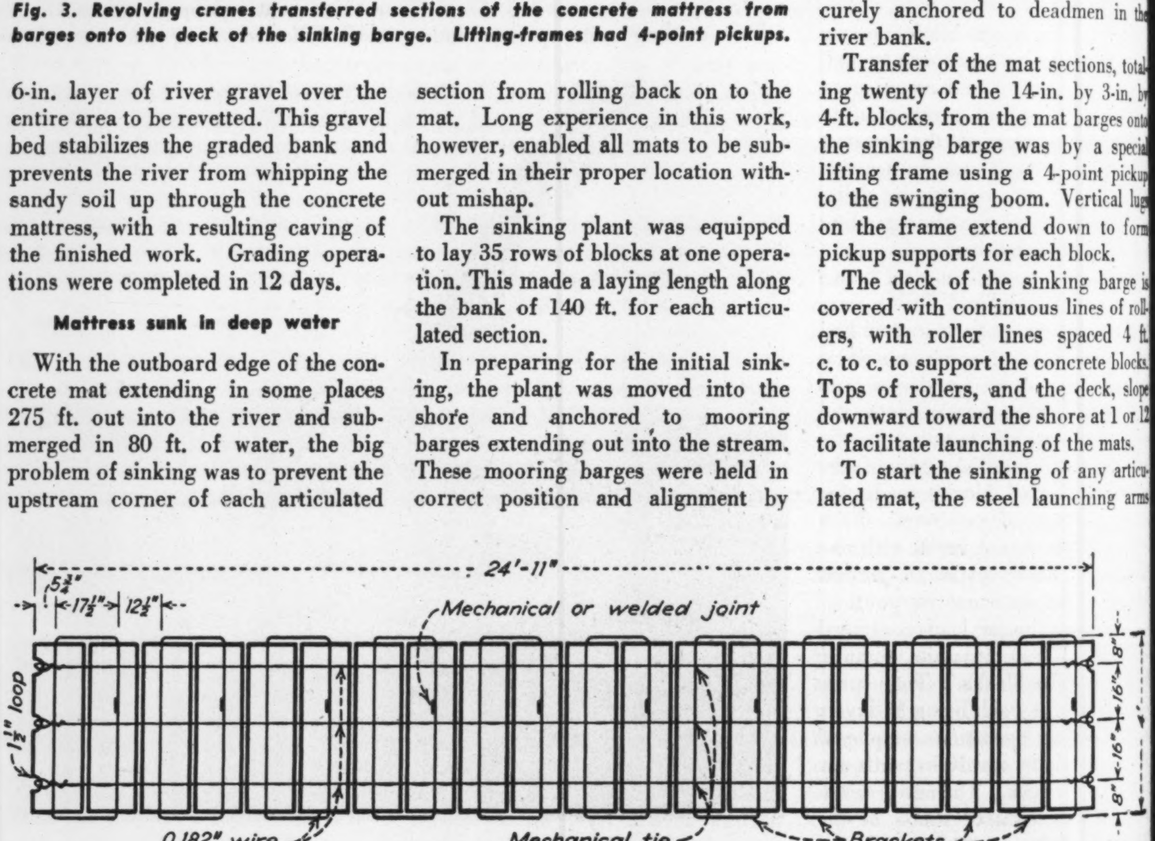


Fig. 4. Each articulated mattress section contains 20 concrete blocks. Projecting ends of wire hoops were wired t anchoring cables during installation of the mattress sections.

nding inshore were retracted, ering the concrete blocks onto the bank. To complete the opera-s, the sinking barge was backed y from the shore, guided by the ring barges, and the weight of mat operated to sink itself. oughout all sinking operations, a safety cable mounted at the reward edge of the sinking barge ented workmen from stepping off the river.

Work progressed upstream

aying of the articulated concrete proceeded upstream. Also, ex-ience had taught the engineers laying it at a slight angle (about deg.) downstream, instead of nor- to the bank produced the best lts. This procedure minimizes tendency of the mat to be under- or to roll up from eddy currents he swiftly moving deep water.

en-foot laps were made on each iously placed mattress. Double s were used at the downstream upstream ends of the revetment k, and also at the outboard edge, nsure greater permanency of in-lation. An additional row of con-e mats extends some 15 ft. up river bank from the top edge of sunken mattress. These mats e placed by a derrick boat an-red close in to the shore which ed them off of a mat barge, hored hardby, and deposited them lace on the bank. This additional k protection overlaps the original tment work from 5 to 10 ft. ing operations were started on ch 16 and finished on March 28. he entire revetment work was per-ned by the Corps of Engineers, g government-owned equipment hired labor. Cost of this bank-ection work was in the neighbor-d of $500,000.

Engineering personnel

evetment operations were under supervision of the Vicksburgh En-er District, Lt. Col. R. W. Sauer, rict engineer, reporting to Brig. . Max C. Tyler, president, Mis-ippi River Commission and divi- engineer, Lower Mississippi ey Division. George Vinzant, er Key Woods, chief of the chan-section, was directly in charge of work. The casting and sinking ations were done by plant and onnel of the Memphis Engineer District, Lt. Col. G. W. Miller, district engineer. G. A. Robinson was superintendent in charge of operations at the site. Thomas A. Goodwin Jr. was in charge of casting operations at Greenville.

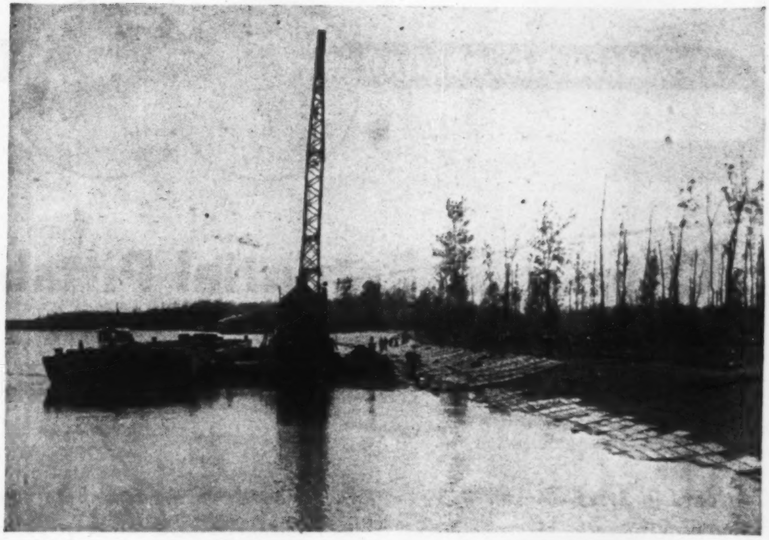


Fig. 5. Only a small portion of the sunken mattress is visible in the completed work. Additional mat sections were unloaded from barges and placed along the upper part of the bank.

Road-Building Projects in Brazil Call For Much Equipment

Brazil needs urgently a wide variety of road-building equipment and supplies to carry out her recently formulated program for highway development. This is reported by the Brazilian Commission of Inter-American Development in a current survey of that country's transportation requirements. The Brazilian National Commission is affiliated with the Inter-American Development Commission, Commerce Department Building, Washington.

Under the program the Brazilian government proposes to construct three systems of highways with a combined total length of 24,000 mi. One highway system would run from north to south, another from east to west, and the third would connect important points of two or more trunk highways. In the north-to-south system, the Getulio Vargas highway is projected between Belem, at the gateway of the Amazon, and Jaguarao, in the south, a distance of approximately 3,700 mi.

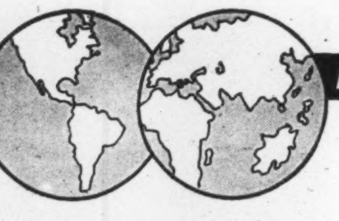
The Brazilian Commission in its survey emphasized the urgency of this highway construction. "At present," the survey pointed out, "the transportation system of Brazil does not look good, and is causing great concern.

"Highways are divided into two different systems and with no inter-connections. One system in the north is of minor importance. The second, of great capacity, is in the south. Highways generally are in poor condition, and in many parts compete with railroads, which also are in poor condition.

"Planning of the Brazilian highway system has been solved with the development of the national highway construction plan. It remains only to carry out this plan, which is in itself a tremendous task and one which can only be affected over a long period.

The commission pointed out that Brazil needs urgently: (1) Machines, tractors and equipment for opening up new roads and for improving and maintaining existing roads; (2) vehicles of all kinds, and in particular, vehicles of a simple nature and adapted to the conditions of the roads and Brazilian climate; (3) fuel and lubricants; (4) spare parts.

ENGINEERING ABROAD



AS SEEN BY ENR EDITORS

Chimbote: Potential Pittsburgh of Peru

Edward J. Cleary
Managing Editor, Engineering News-Record

Contents in Brief*—A vast industrialization program in the Chimbote Bay region undertaken by several agencies of the Peruvian government, principally Corporacion Peruana del Santa, has enlisted the aid of North American consultants, contractors and engineers. Although various elements of the program are separate and distinct all of them involve the skills of the engineer directed toward the single objective of improving the economic prosperity of Peru. Projects now under way include installation of port works, housing and sanitation facilities at Chimbote, rehabilitation of a railroad, coal mining, construction of a 125,000 kw. hydroelectric plant, and the extension of irrigation works. Preparations are continuing also on a coal, iron and steel industry at Chimbote, expected to cost in the neighborhood of $12,000,000.*

DON FEDERICO, who can lay claim to the dubious distinction of operating the best eating place in Chimbote, is witnessing the development of the most ambitious industrial and agricultural enterprise ever undertaken in Peru. He and his 4,000 fellow townsmen in this village at the edge of one of the finest natural harbors on the west coast of South America see many tangible evidences of things to come, but they can hardly be aware of the tremendous scope of the undertaking. Here several agencies of the Peruvian government have combined their efforts for the establishment of a coal, iron and steel industry, development of hydroelectric and irrigation works, the construction of port works and the installation of sanitation facilities.

A few months ago when this writer visited Chimbote, which possesses few of the amenities such as water supply or sewerage facilities, Don Federico had just opened a new and more expensive eating place. While it left much to be desired as far as elemental sanitation was concerned, the big adobe building with its incongruous shiny mechanical refrigerator, did accommodate more people and business was picking up. Several hundred men already were working for the Frederick Snare Corp. of New York on the construction of port works and coal handling facilities. Back from the coast in the mountain area anthracite mining operations were under way. And eighty miles distant, on the Santa River, progress was being made on a 125,000 kw. hydroelectric project that will supply cheap power in the area. In Chimbote itself, North American sanitary engineers loaned to the Peruvian government were engaged on the installation of drainage structures for malaria control, a water supply and sewerage system, and construction of a hospital.

Chimbote claims historical as well as current interest to North American engineers. When I first saw the town, circling above it in a plane at an elevation of about 1,000 feet, I noticed that it was laid out in a gridiron pattern, so typical of small cities in the United States. Later inquiry revealed the layout to have been made by Henry Meiggs, an American civil engineer who went to Peru in the 1860's, and there distinguished hi self as a builder of railroads. O testimonial to his endeavors is a hu silver cup on permanent exhibit the Pan-American Union Building Washington, which was presented Mr. Meiggs in 1871 on the completio of the Oroya Railroad in the And of Peru.

As a city planner Mr. Meiggs a parently was far ahead of some of h colleagues in the United States, jud ing on the basis of street layout. No of the streets in Chimbote are le than 65 ft. in width, and the princip thoroughfare provides a generous 2 ft. Chimbote had no difficulty, ther fore, in accommodating itself sever years ago to the Pan-American Hig way with its 27 ft. width, and t town never will need to be concerne with future traffic problems.

Since the Chimbote project with i related industrialization enterpris involve a number of participants, t role of each might best be describe by discussing separately the variou activities now under way.

Coal, iron and stee

Development of the coal, iron an steel industry, formerly an underta ing of the Peruvian Ministry of D velopment and Public Works, is no one of several projects of Corpor tion Peruana del Santa, an agency o the Peruvian Government. The f nancing of the coal, iron and steel i dustry anticipates aid from the U. Export-Import Bank in the form o a loan. Agreements negotiated i April 1942 point to the availabilit of credits from the bank.

In 1942 H. A. Brassert and Co Inc., consulting engineers of Ne

York, reported that at Chimbote ore and coal, the two principal raw materials, can be assembled at low cost. The anthracite coal would be carried directly from the nearby Ancos-Galgada mines over an existing narrow gage railway to the plant and harbor, and the ore would arrive by water. The ore boats would tie up at a pier from which the ore would be transported by conveyor directly to a blast furnace plant. The same pier and conveyor system would serve for the exporting of anthracite coal. Estimated to cost $12,500,000 the coal, iron and steel development would be self-liquidating, and should be amortized within 7½ years after operations begin. Some 80 percent of the project cost would represent equipment and materials that must be purchased outside of Peru.

Morfitt and Co., also of New York, were later engaged by Corporation Peruana del Santa in conjunction with the Export-Import Bank of Washington to examine the properties and they are now completing an independent report on the general feasibility of the coal, iron and steel enterprise.

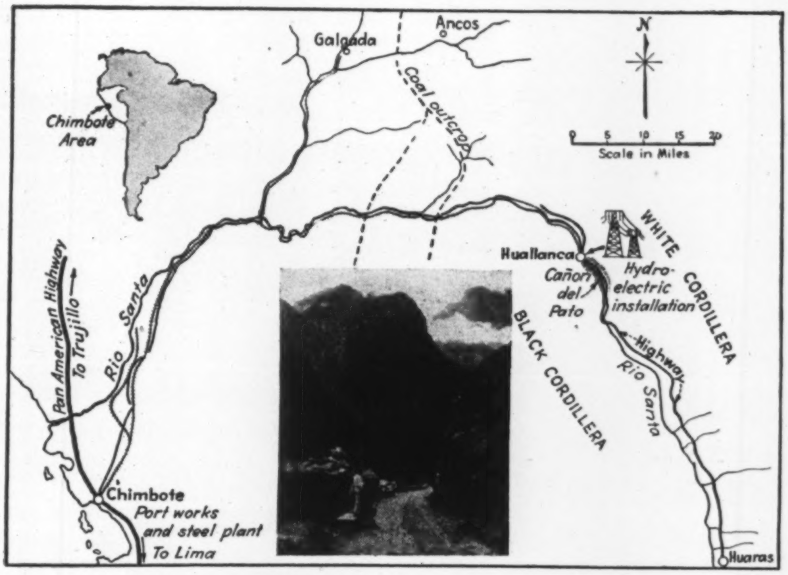
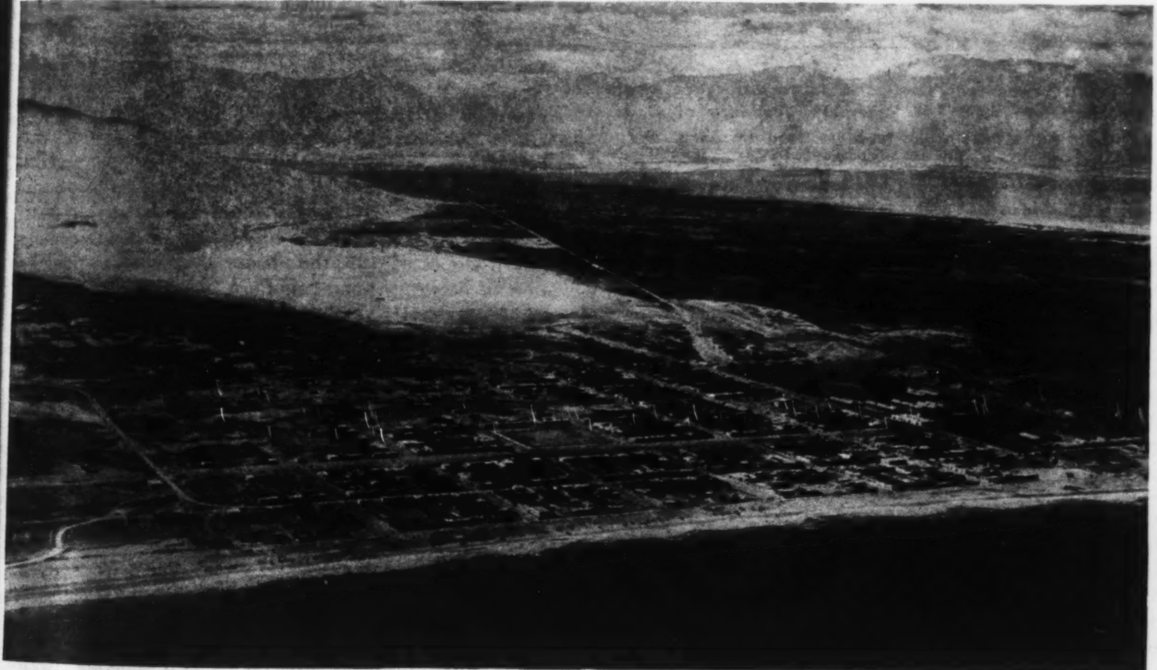

Galgada
Ancos
Coal outcrop
N
0 5 10 15 20
Scale in Miles
Chimbote Area
Pan American Highway
To Trujillo
Rio Santa
Huallanca
Cañon del Pato
Hydro-electric installation
WHITE CORDILLERA
BLACK CORDILLERA
Highway
Rio Santa
Chimbote
Port works and steel plant
To Lima
Huaras

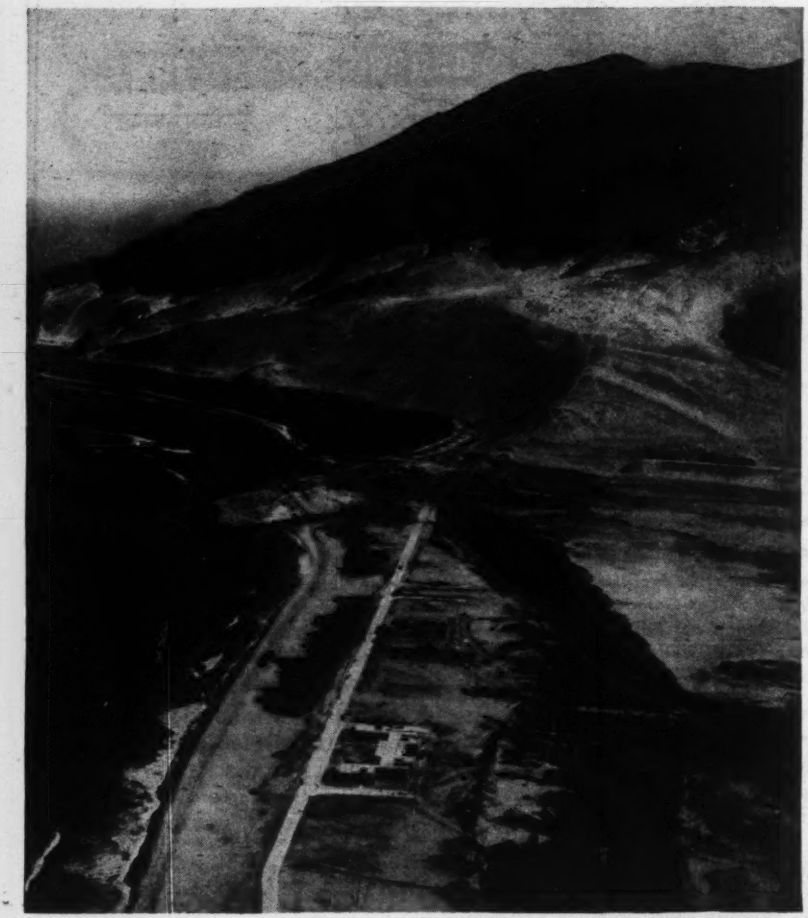
Fig. 1. Activities in the Chimbote area embrace the construction of port works and sanitation facilities at the seaport town of Chimbote, coal mining operations in the Ancos-Galgada region, and the installation of hydroelectric facilities in the Canon del Pato. The rugged terrain at the latter location is shown by the inserted photograph of the highway on the east side of the gorge.

The proposed steel plant at Chimbote would be located about fifty miles from the coal deposits. However, suitable iron ore is not available in this area, the best deposits being located some 500 miles south of Chimbote. Since these deposits are close to the coast it is possible to use water transportation for moving the ore. Drilling operations in this area, known as the Marcona region, are reported to have shown the existence of



Peru-Servicio Aerofotografico Nacional photo

Fig. 2. Chimbote hugs the seacoast on the desert plain between the Andes Mountains and the Pacific Ocean. The road at the left, which turns into the town and runs parallel to the coast, is the Pan-American highway. Irrigation has made possible the cultivation of a strip of desert shown at the right. The port works are located to the left, just beyond the range of this photo. In the background can be seen the foothills of the Black Cordillera range.



Peru-Servicio Aerofotografico Nacional photo

Fig. 3. Port works and coal-handling facilities are located at the base of the mountain which forms the northern boundary of Chimbote Bay. Pile-driving operation for a small pier can be seen offshore; a rockfill to this pier will eventually be carried out for a distance of half a mile. A new concrete road parallel to the shoreline furnishes access to the town; the proposed steel plant will be located to the right of this road.

about 10,000,000 tons of reserves. Present plans call for the open pit mining of ore.

It is proposed to smelter the ore at Chimbote, using fines from the nearby anthracite coal mining operations. Ordinarily, such fines are a total loss, but the Brassert Co. engineers report that it is possible to process these fines in combination with pitch (15 to 25 percent to produce a high quality metallurgical coke for blast furnace and foundry use. Bituminous coal, normally used in steel-making operations, is found only at long distances from the Peruvian seaboard and, therefore, is not economically available.

The Ancos-Galgada anthracite deposits in Peru are easily accessible to the coast at Chimbote, the deposits outcropping on the western slopes of the Andes at an elevation of between 4,000 and 6,500 ft. above sea level; the coal seams are from 1½ to 8 ft. in thickness. Improvement of an existing narrow gage railway to the port of Chimbote makes it possible to ship the coal on a downgrade directly to the port.

The bulk of the anthracite is to be sized and sold in domestic and foreign markets, shipments of which have already been made; annual production is anticipated to be 300,000 tons. The heretofore useless fines that result from mining, crushing and handling (estimated at 90,000 tons annually) will find ready and profitable application when steel production begins.

The possibilities of developing a cement industry at Chimbote are now under consideration with a view toward finding a profitable outlet for the blast furnace slag. Such slag, mixed with lime and alumina, will produce a high grade cement as evidenced by the product produced in this country by the U. S. Steel Corp. and others.

Plans proposed by the Brassert organization for the iron and steel manufacturing facilities include a 300-ton blast furnace; a duplex steel plant; mills for merchant bars, wire products, sheet and tin plate; and a foundry for cast iron pipe. It was not considered economically feasible at this time to undertake the production of large structural sections, heavy rails and wide strips. The more recent plans contemplate the production of fewer products, confining them possibly to reinforcing steel, rails, etc.

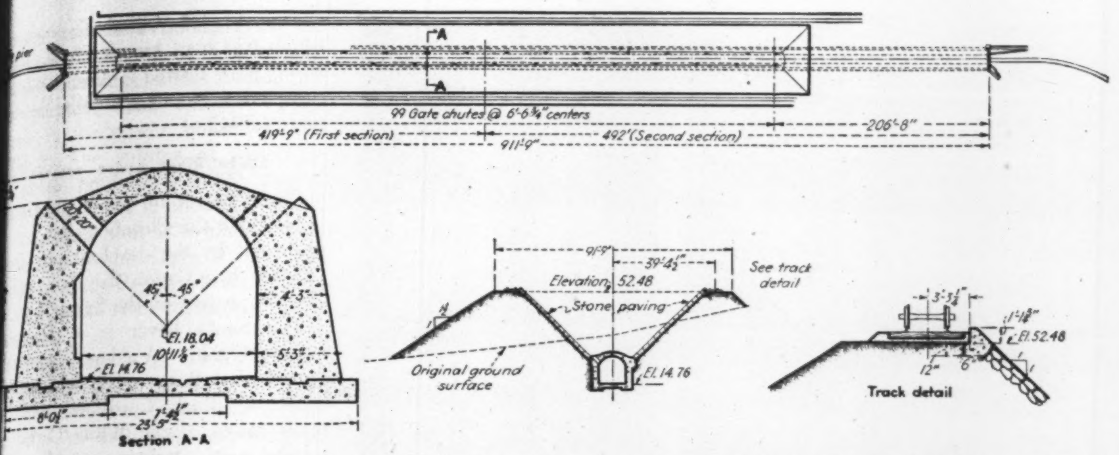
Alexander C. Barker, vice president of Brassert and Co. and director of the firm, in discussing the Chimbote project pointed out that:

"The iron and steel plant with much of its equipment must be specially designed, because the raw materials and manufacturing program will be different from what they are anywhere else. In the U.S.A., where at all but a few plants ore mixtures are used which are alike in general character, we have developed a standard type of blast furnace which has not changed very much in the past twenty years. The open hearths, too, are of standard design and so more or less are the various rolling mills. But all these units are too large, too heavy and too highly specialized to conform to the demands for an economical plant in Peru, working different raw materials and producing from these a variety of products, each in small quantity. In fact steel plants all over the world, to be a success, must be adapted in the choice of processes and of design and construction to their raw materials, markets, and many other local conditions."

Port handling facilities

Actively under construction at the present time are the port works and coal handling facilities for which the Frederick Snare Corporation holds the contract. This portion of the Chimbote work, which is financed entirely by the Peruvian Government, is divided into three parts, as follows:

1. Construction of a section of the



. 4. Layout and details of the coal storage and handling facilities. A concrete tunnel or gallery is located at the apex ngular-shaped storage area formed by fills on each side of the gallery. Side-dump coal cars operated on top of the will be emptied into the area between the fills; coal can then be drawn from storage through the tunnel.

l handling facilities, a rockfill and all pier for the accommodation of hters, an 8-mi. railroad spur, a using development and miscellanus small buildings. Total cost is out $1,000,000.

2. Extension of the rockfill to deep ter and construction of a pier to commodate ocean going vessels, as ll as the installation of conveying uipment to move out coal and ing back ore from ships, constitute e second and final part of the conct. This work is estimated to total other $800,000.

3. Installation of a municipal wa r supply system, sewers and draine works, as well as the construction a 56-family housing project for rkers. The total for these contract ms is over $300,000.

Coal handling procedure

Special interest attaches to the degn of the structure for storing and ndling the coal brought down from e mines, which has the virtues of mplicity and flexibility. It consists nothing more than a long concrete nnel gallery on either side of which ere is a sloped and paved fill. Coal rs operating on top of the fill dump eir contents into the V-shaped storge space between the two fills. When is desired to draw coal for shipent small cars are moved into the nnel gallery, which is under the se of the V, and the coal may be resed by gates through chute holes in e tunnel roof from any part of the ng storage pit; the deposit has a pacity of 40,000 tons (Fig. 4).

One of the obvious advantages of this arrangement, aside from its simplicity of operation, is that the lowest part of the pile is drawn upon first, thus eliminating dead storage with resultant deterioration of coal. Another advantage lies in the fact that eventual substitution of a conveyor belt for the present car hauling system can be made without disturbing much of the original construction.

Details of the structure, which was designed by W. A. H. Grantz, Lima manager of the Snare Corporation, are shown in Figs. 4 and 5.

Rockfill and pier details

The shelving beach in Chimbote harbor calls for the construction of a rockfill that eventually will extend

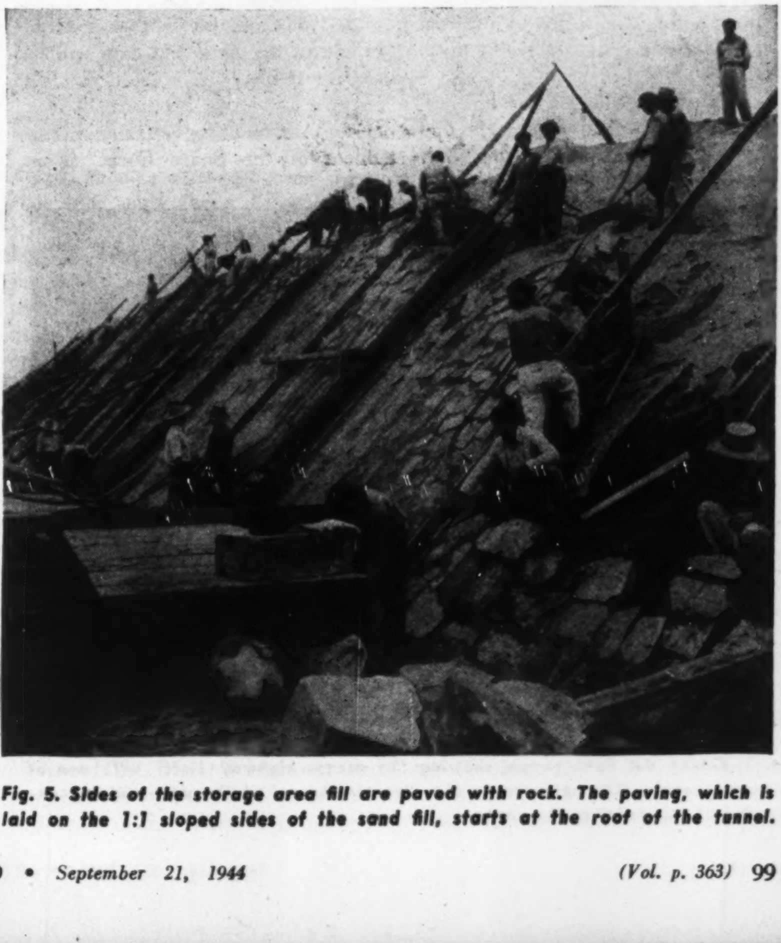


Fig. 5. Sides of the storage area fill are paved with rock. The paving, which is laid on the 1:1 sloped sides of the sand fill, starts at the roof of the tunnel.

Fig. 6. Rock for paving and for the harbor fill is quarried from a nearby hill.

some 2,600 ft. into the bay. At the end of the fill, which is 50 ft. in width, there will be a 600 ft. concrete pier supported on reinforced concrete piles and equipped with ore and coal handling machinery. A minimum water depth at the pier of 26 ft. will permit the accommodation of large ships. At present the rockfill has been completed for about two-thirds of its length. A dense, granite rock for the fill is obtained from a nearby hillside quarry and trucked to the dumping area.

In addition to this work, there has been constructed and is now in operation a smaller pier jutting out from the rockfill at an angle of 45 deg. and at a distance of 1,300 ft. from the shoreline. Constructed of concrete throughout, this pier is supported on 143 reinforced concrete piles, 18 by 18 in. in cross-section and 60 ft. in length.

Four gantry cranes are installed on this pier for servicing lighters and small boats that can be operated in a 16 ft. depth of water. Track is laid on the fill from the coal deposit to the end of the pier, and cars will be used for transportation until the belt conveyor system is installed.

George F. Waters, veteran superintendent of the Snare Corp., is in charge of the Chimbote work, o which 650 men are employed. Operations were started in April 1942, and completion is anticipated by the summer of 1945.

Santa River hydro project

Cheap power for the stimulation of industry in the Chimbote Bay area is promised by the development of the 125,000 kw. Canon del Pato hydroelectric project on the Santa River.

The Santa River is a torrential, non-navigable Andes mountain stream that flows north between the coast or Black Cordillera and the main range of the White Cordillera on the east. Draining a valley that receives the run-off from 110 sq. mi. of mountains whose snow-clad peaks tower to 22,200 ft., the Santa River eventually turns west and then south to empty in the Pacific Ocean. (Fig. 1).

In one section of the river, known as the Canon del Pato, there is an abrupt fall of some 1,400 ft. in a six-mile stretch. It is this location that has been chosen for the hydroelectric project. An overflow diversion dam will be erected at the upper end of the canyon and here the water will be diverted through a pressure tunnel leading to a powerhouse at the end of the canyon. The dam, to be built of cemented granite masonry, will be 72 ft. in height and the length along the overflow crest 82 ft.

Difficult tunnel operations

The conduit tunnel, which is being driven within the east wall of the canyon is roughly parallel to the stream bed. It is to be of a modified horseshoe shape with a cross-sectional area of 280 sq. ft., and will have a length of 29,950 ft. (5.7 miles). Tunneling operations in the granite wall are being conducted from six adits, spaced to give an approximately equal division of the work. The steep and rugged nature of the canyon wall necessitated the installation of cableways across the river at each of the adits in order to gain access to them. The only highway in the area is on the west side across the canyon from the tunnel. See map, vol. page 367).

The power house will be located about a mile from the town of Hullanca, or about 75 miles northeast of Chimbote. This structure is distinguished by the fact that it will be built deeply underground to avoid

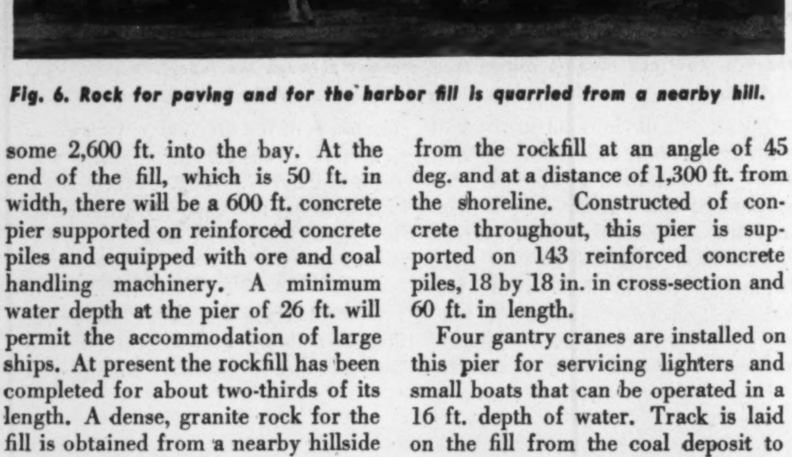


Fig. 7. Canon del Pato gorge, showing the access highway (left) with one of its many tunnels. The entrance to the diversion tunnel at the dam will be constructed at this point in the gorge.

mage from rock falling from the nyon wall. Served by five vertical afts connecting to the tunnel, the t operating head on the Pelton eels in the power house will be 300 ft. The volume of water re- ired to produce 100,000 kw of wer at this head is about 1,060 sec. , an amount that is available most the time in the Santa River. Dis- rge from the Pelton wheels is to be urned to the river through a 1,575 tunnel.

Estimates made in 1941 indicate at the cost of the initial installation two 25,000 kw. units will be $4,- 0,000. An additional expenditure $1,875,000 would be required for o more units. Cost of producing wer with the initial two units (45,- 0 kw. net), is estimated at slightly s than 1/10 of 1 cent per kilowatt ur on the basis of total utilization.

Construction operations began in ly 1942 with the erection of a 1,000 . hydroelectric plant near the site the diversion dam; this unit sup- ies power and light for construction rposes. Attention was also given providing general camp facilities cess to the tunnel adits and to the ginning of tunnel excavation. At e present time the project is 20 per- nt completed, and it is expected that e first two generators will be in eration in 1946. (Editor's Note: *detailed description of the hydro- ectric project will be found at the d of this article.*)

Barton M. Jones, former head anning engineer of the Tennessee alley Authority, is acting as engi- eer-director in charge of the project.

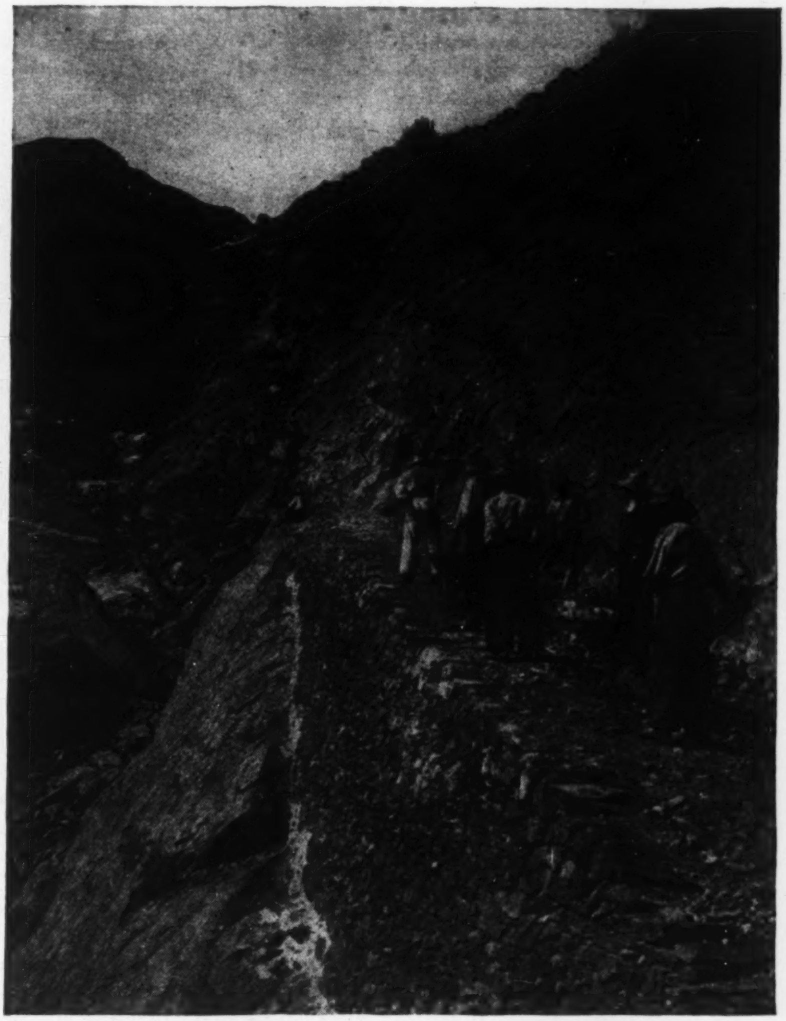


Fig. 8. Building a side-hill bench to carry a 28 in. steel penstock. This installation was made for a 1,000 hp. power plant to serve construction needs.

Santa irrigation plans

Aside from its hydroelectric power otentialities, the Santa River is also ommanding attention as a further urce of irrigation water. Pouring ore water into the Pacific than any her stream in Peru, it traverses a y, coastal plain in its journey from e mountains to the ocean.

Much of the area around Chimbote d the coastal area north and south the Santa River is virtually a des- t. Yet, in the days of the Incas, this nd was productively farmed, and ere are still to be seen many evi- ences of the remarkable canal and aterway systems built by these In- ians.

In talking with Charles W. Sutton, North American engineer who has been working on irrigation problems in Peru for more than two decades, the writer was told that the Incas had at least 50 percent more land under cultivation than is at present used for farming in this country.

"The people of Peru," said Mr. Sutton, "do not produce adequate food. This lack of food is not an emergency problem but a chronic condition. But the general policy of irrigation, cheap power, roads and works of public utility, if properly coordinated, will make it possible for the population living in the irrigated districts that constitute so large a part of Peru to have many crops available inside their own neighborhoods."

One of Mr. Sutton's recommended projects, the irrigation of some 250,000 acres in the Santa River area, is now expected to reach fruition as a result of the Chimbote industrialization enterprise. Plans are being activated for the installation of water diversion and storage works some miles below the Canon del Pato power plant. And in conjunction with this, it is hoped to harness the river for the production of small units of power that may be required for irrigation needs.

Sanitation at Chimbote

A principal concern of those who are laying the groundwork for development and expansion of the Chimbote area is sanitation. Lacking a water system worthy of the name, and completely without sewerage facilities, the town also had the misfortune to be adjacent to freshwater lagoons in which mosquito breeding was prolific. It is hard to conceive that 4,000 people—eking out an existence by farming and fishing—continued to survive as well as they did. Malaria, waterborne and other energy sapping diseases are prevalent in the area.

An excellent opportunity to correct these conditions presented itself when the Office of the United States Coordinator of Inter-American Affairs made an agreement with the Peruvian Government in 1942 to aid in the establishment of certain health and sanitation projects. One of the recommended projects was the Chimbote work, and in December 1942, Maj. B. A. Whisler of the Army Sanitary Corps, who was detailed to the Coordinators Office, arrived on the scene. Later he was joined by Maj. R. K. Horton, also of the Sanitary Corps.

Backed with a half million dollar fund, $350,000 of which was supplied by the United States and the balance from the Peruvian government—these men designed and began construction of drainage work for the lagoons, a water supply and distribution system, sewerage facilities and a small hospital. A detailed story of their technical accomplishments will be told in a forthcoming article.

A word should be said about their devotion to the task in hand, which was a challenging one in many respects. The engineering problems were not easy, considering the lack of basic data and properly trained personnel to assist in making surveys and to guide the labor gangs. One of their minor problems was to discourage the natives from removing the carefully driven survey stakes—the lack of timber in this region put a special value on the wood stakes. And with all due regard for Don Federico's eating place, his standards of sanitation in food preparation required that the patrons of this establishment be fortified with a sense of resignation and some strong digestive juices. Horton and Whisler had both, but eventually a bug identified as *Endamodba his* *lytica* got Whisler and he recent returned to this country.

Rapid progress being made

Today, just a few months since t writer left Chimbote, great chang already may be noted. For examp in the first annual report of the Co poracion Peruana del Santa, t agency organized in June 1943 to ce tralize control of industrial projec in the area, it is revealed that Chi bote's port works already are in pa tial operation. This coupled with t rehabilitation of the railroad leadi to the mines made possible the e portation of 18,000 tons of coal ov a period of five months.

Recently returned travelers fro Chimbote tell of the rapid constru tion of workers' housing faciliti and of the municipal water supp and drainage structures now in ope ation. And progress on the hydr electric project is indicated in t article that follows.

Unusual Design Features Distinguish Hydroelectric Project in Peru

***Contents in Brief**—Details of the hydroelectric project briefly described in the preceding article on Peru's industrialization of the Chimbote Bay region reveal departures from conventional practice. Among these are the subterranean location of the power house, a dam with its vertical face on the downstream side, and the use of an unlined pressure tunnel.*

SEVERAL FEATURES distinguish the Canon del Pato hydroelectric project in Peru where construction operations have been underway for two years. Here, in a six-mile stretch of the Rio Santa, advantage is being taken of the fall of 1,400 ft. in the river bed to provide for the ultimate development of 100,000 kw. of continuous energy at a cost of 0.7 of a mill per kilowatt hour on the basis of total utilization. Natural conditions have imposed some departures from conventional practice, but most of these have been developed into advantages.

For example, the solid masonry overflow diversion dam must be built with its vertical face on the downstream side of the structure. Again, because of the necessity of using a subterranean site for the powerhouse, it has been possible to locate this facility far underground. And finally the 5.7 mile continuous conduit tunnel and the five vertical penstock shafts may be operated under pressure without a concrete or steel lining, due to their deep location in solid granite of superior physical structure. As a precaution and as a test of the structure, cement grouting at not less than 1,000 lb. pressure will precede the excavation of tunnel and shafts.

Surveys and examinations made in the Canon del Pato since 1941 have verified the fact that this is an outstanding site for the development in a single installation of 125,000 kw. of extremely low-cost power, within a transmission distance of less than 80 miles from the best natural harbor on the western coast of South America. Continuous operation a 100,000 kw. will require about 1,06 sec. ft. of water, an amount that wi be available most of the time from the flow originating from the glacier and areas of perpetual snow on th watersheds extending along 110 mile of the east side of the canyon. No daily regulating reservoir is contemplated since the maintenance of such a structure would not be feasible. Neither is it proposed to include seasonal storage for the regulation of the flow. However, advantageous reservoir sites do exist at the headwaters of Rio Santa that may be developed when warranted for the combined purposes of irrigation and power.

Details of the dam

As shown in the accompanying photos, the dam site is narrow and deep, with steep walls. Since no water storage is being provided, the diversion dam needed to be only 72 ft. high, and the crest (at elevation 5,930 ft. above sea level) will be only 82 ft. long.

The dam is so designed that all its tures will satisfactorily withstand ects from the overflowing water n with the heavy sand and stone ris flowing in the Rio Santa, es- ially during floods and the high ter season. Large granite blocks d in cement mortar will be used at surfaces where the dam will be osed to erosion, and the interior l be cyclopian masonry of concrete d granite.

An unusual feature of the design to vent erosion is the provision for vertical face of the dam to be on downstream instead of upstream e, in order that the stones carried r the crest will fall clear of the face d directly upon a cushion of stone the canyon bottom. The arrange- nt assures an automatic and con- uous replacement of the stones ming the cushion. No provision l be made to remove the accumu- ion of debris upstream from the m. It is contemplated that the small sin will become completely and manently filled with stones and vel within a few weeks after com- tion of the dam.

Upon the fixed masonry crest of e dam will be installed an A-frame pe of adjustable steel crest for con- lling the surface elevation of the ter opposite the intake. The frames, out six feet in height, may be ised or lowered one at a time from overhead cableway. The A-frames l be built in units with bases of nvenient size, any one of which may removed when damaged or eroded, d replaced by a completely new sembled spare unit.

During construction of the dam, ich will be done during one sea- n of low run-off, the water of the er will be diverted through a by- ss tunnel about 750 ft. in length, cavated below the river bed in the st wall of the canyon. (Fig. 4).

In preparing the foundation for the m, the river channel will be ex- vated to the solid rock bottom. Ex- vation into the sides or bottom of e site for bond or anchorage of e dam does not appear to be neces- ry and probably the operation will avoided. The sides of the canyon erhead will be stripped, so far as acticable, of stones or other ma- rial that might, by falling, endanger e structure or its operation.

Fig. 1. Canon del Pato looking downstream opposite the site of the underground powerhouse.

The intake structure will be located on the east or right-hand side of the canyon, adjacent to the dam. The sill of the intake will be higher than the fixed crest of the dam for the purpose of gathering the clearer surface water while allowing the lower layers of the water laden with rock, gravel and sand to pass by the intake and over the dam.

However, it would be nearly impossible to prevent small stones, gravel and sand from entering the intake and tunnel with the water. Therefore, heavy horizontal rack bars will be installed to deflect the boulders from the entrance. Small rock, gravel, and coarse sand will be removed from the water by wasteways in the tunnel near the intake. A sand trap of suitable size and design will be located underground in the tunnel a short distance downstream from the intake, and another will be placed at the lower end near the top of the penstock shafts. (Fig. 4.)

The massive solid granite forming the right-hand or east side of the Canon del Pato is of such physical structure that it permits the location and construction of a tunnel suitable to operate under any desired pressure. The advantages of operating under pressure are that it will simplify control of the completed system, and the loss of head at any time will be no more than that caused by the amount of water being used according to the load being carried.

A larger unlined tunnel will cost much less, of course, than a smaller lined one of the needed flow capacity. Furthermore, it is doubtful if a concrete lining in the tunnels would serve to prevent transmission of the internal water pressure to the small seams in the granite formation. For these reasons concrete lining will be used only at isolated places where loose formation may be encountered.

A feature of the design that will further assure against the need for concrete lining is the employment of high-pressure grouting in advance of the tunnel excavation; this will stabilize the formation and close any seams that may exist in the formation. A test for leakage will first be made by

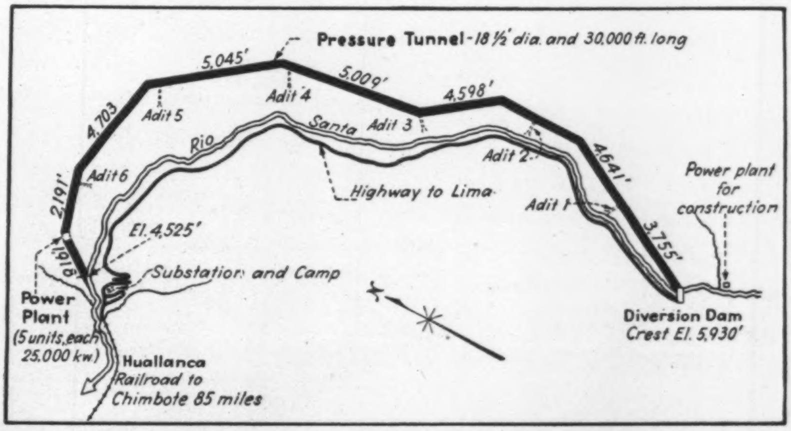


Fig. 2. Principal features of the Canon del Pato hydroelectric project are an overflow diversion dam, a 5.7-mile tunnel and an underground powerhouse. In this canyon section of the Rio Santa there is an abrupt fall of some 1,400 ft., which fact led to its selection for power development. Because of the precipitous canyon walls access to the tunnel operations can be gained only by cableways across the gorge to an existing highway on the west bank.

Fig. 3. Removing loose rock from the sides of the canyon at the site of the dam. Since this structure is not intended to provide storage but will serve simply for diversion of river flow, it will be only 72 ft. high, the width of the dam is 82 ft. A flow of some 1,100 sec. ft. draining from areas of perpetual snow will be available most of the time.

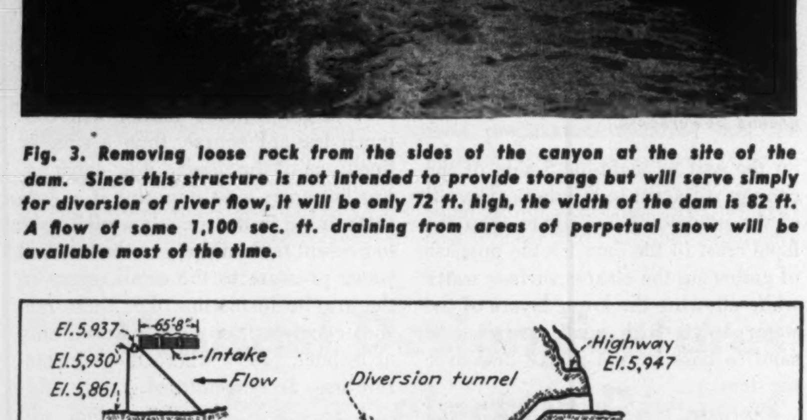


Fig. 4. Plan and sections of the dam, intake structure and the bypass tunnel in the narrow gorge of the Canon del Pato. Note that the vertical face of the dam is on the downstream side of the structure. Design of the wasteway for removing sand and gravel is shown in Section B-B. When the dam is completed the bypass tunnel will be sealed with a concrete gate, as shown in Section D-D. A detail of the bypass tunnel entry is shown in Section G-G.

applying water under pressure to t or three holes drilled as deep as fe ible in advance of each headin Should the holes indicate leakage, th will immediately be grouted with ne cement grout to refusal at a pressu of not less than 1,000 lb. per sq. i If found more suitable, a quick-settin cement may be used for this groutin With this procedure, the drilling a blasting will be in formation that known in advance to be both stab and watertight.

The tunnel alignment has be located at such a depth within th mountain that at no point will th water find relief at the surface of th rock within a distance of at lea double the head on the tunnel und static conditions. This provides libe ally for the seams in the formation t resist the internal water pressu transmitted to them, and the distanc is sufficient to develop frictional r sistance and retard leakage of wate

The cross-section and gradient o the tunnel has been designed fo 150,000 kw. with a liberal margin o safety regarding the coefficient of fri tion. A "horseshoe" section that i almost circular has been adopted; th diameter is 18.37 ft.

Method of construction

The general location of the tunne is shown in Fig. 2. From each of si adits excavation will proceed at tw faces, one progressing upstream an the other downstream. Locations o the tunnel and adits have been so adjusted to the topography that the wor to be done and the time required b all of the twelve headings will b approximately equal. By alternatin the use of equipment between the tw headings, one set of drilling and mucking equipment will suffice for eac pair of headings reached from eac adit.

A tunnel profile has been adopte that will provide a downgrade fro each heading to the entrance of eac adit just sufficient to move the loade roller-bearing, muck cars by gravit This procedure was considered to b the most feasible method for handlin the muck under the prevailing conditions. Furthermore, the profile provides natural drainage and the consequent avoidance of pumps and pipin that might otherwise be needed.

At all of the adits the floor of th tunnel is at the same elevation, 5,805.6 feet. The accumulation of entrapped from the water will be drained n each apex in the tunnel through nanently installed piping.

Underground powerhouse

he site of the powerhouse is 1 upstream from the town of Hual- a, or 87 miles by rail from Chim- . The absence of a site suitably e for the powerhouse and which ld not be exposed to destructive ng rocks compelled the adoption n underground location excavated olid rock.

he site is in the mountain, 1,375 rom the river at its nearest point. floor elevation will be such that equipment that would be damaged made inoperative by floodwater be placed above El. 4,575. This he level that would be reached er full-load operation during a water equal to the record Huaraz d of December 1941.

he underground chamber, approx- tely 50 ft. wide and 250 ft. long, be made proof against infiltra- of water by high pressure grout- and special drainage. Such parts he walls and roof that require ilization will be lined with con- e and steel.

reliminary specifications for the erating units have for some time in the hands of manufacturers. said that these were made as free possible from limitations in order the manufacturers could collab- e in determining the type and de- most advantageous to their shops current conditions as well as to project. Units each having a ca- ity of 25,000 to 27,000 kw. of the izontal shaft, double overhung im- e type with two nozzles per run- at a speed of 450 rpm. appear be most advantageous. The pos- e alternative having some advant- s would be vertical units of the e capacity and speed having four zles operating on one runner. The ical machines would, of course, less rugged, and with all the wear a single runner the repairs to it ld be more frequent; with the er of Rio Santa this would be a ous disadvantage.

he electrical characteristics are to 3-phase, 60 cycle current gener- d at 13,800 v. with transmission at less than 110,000 v. These cor- pond to the existing systems of a and of Cerra de Pasco.

Fig. 5. Cableway cars of this type are used to transport men across the gorge from the access highway. Virtually all the equipment and materials for the tunnelling operations must be handled by means of cableways.

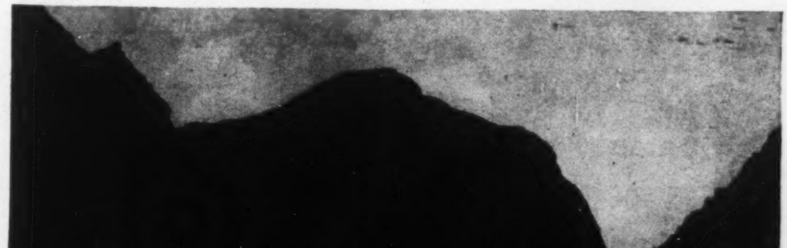


Fig. 6. One of the first jobs on the project was to build a steel penstock from a small stream to a point near the site of the dam where a temporary power plant could be installed.

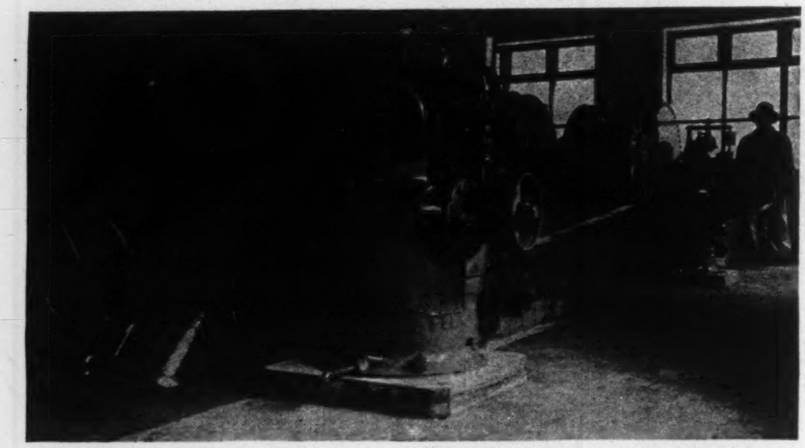


Fig. 7. Two waterwheel generator units, each of 500 hp., were installed to provide power required for construction operations.

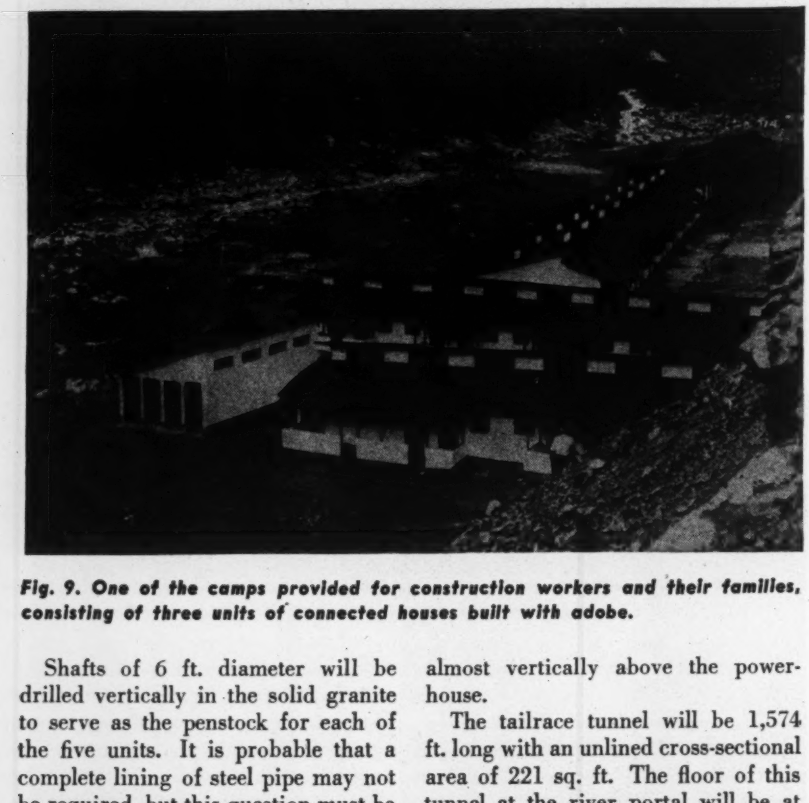


Fig. 9. One of the camps provided for construction workers and their families, consisting of three units of connected houses built with adobe.

Shafts of 6 ft. diameter will be drilled vertically in the solid granite to serve as the penstock for each of the five units. It is probable that a complete lining of steel pipe may not be required, but this question must be determined during the period of drilling, testing, and grouting. The total drilled depth of each shaft will be 1,435 ft. from top to bottom (between El. 6,002.4 and El. 4,567.4). These shafts will be drilled with the type of "calyx" drill that descends down the hole as the work progresses. Water passages will be made from each shaft to the top of a transverse manifold or header tunnel at the downstream end of the pressure tunnel located almost vertically above the powerhouse.

The tailrace tunnel will be 1,574 ft. long with an unlined cross-sectional area of 221 sq. ft. The floor of this tunnel at the river portal will be at El. 4,546, about 10 ft. above the normal river surface.

Another tunnel at a higher level will accommodate a railway track for the delivery of machinery to the powerhouse. This track will be served from a one-mile extension from the present railroad terminus at Huallanca which will be built on a graded surface constructed several years ago. The tunnel will also provide permanent access to the powerhouse, ventilation, and space for control cab and the outgoing power cables 13,800 v., as well as for pipes servi various purposes.

The strategic value in having lar sources of industrial power pro against bombing attacks from the has not been overlooked. With t powerhouse, penstocks and all of t water conduit far under the surfa the important elements of the R Santa project will be free from bom ing hazards.

The transformers will be install on a masonry bridge adjacent to t access tunnel, and the nearby switc yard will be reached by single hig tension spans from each bank of tran formers. The transmission lines w depend upon the size and location the various loads and they have n been definitely established other th that the principal delivery will be Chimbote at a distance of 75 mile

Project direction

The Canon del Pato hydroelectr project is sponsored by the Corpor tion Peruana del Santa, a Peruvia governmental agency operated by board of five directors, of who David Dasso serves as chairman an as manager. Mr. Dasso, who holds engineering degree from the Mass chusetts Institute of Technology, w one time a vice-president of Amer can Locomotive Works in the Unite States. Prior to his connection wi the **Corporacion** he was Minister Finance of Peru.

From its commencement in Ju 1942, Barton M. Jones, as enginee director, has been in charge of th project, which is designated officiall as Central Hidroelectrica del Can del Pato section of Corporation Pe uana del Santa. For the previous nin years Mr. Jones was associated wi the Tennessee Valley Authority, ser ing successively in charge of Norr Dam including much of its desig then for more than two years chief design engineer on all the pro ects and holding the position of hea planning engineer at the time of hi resignation to go with the Peruvia government. He recently visited th United States to make arrangement for the delivery of tunnelling an other equipment.

Construction work on the project the present time is reported to b about 20 per cent complete.

Culvert Designed to Smooth Stream Flow

I. Greenfield
Louisville, Ky.

UDY OF STREAM FLOW on a moun- in stream in New York led to an usual design of culvert. Low avail- le headroom and a crooked channel re part of the field difficulties to ercome.

The stream flows through a narrow lley about three times as long as its idth. The ground is wooded and the pes are mountainous. Increase in pulation in the area indicates that me of the woods will disappear and consequence the stream flow will crease during rains of high inten- y.

No records of stream flow existed, the size of the structure required s established from local data, rgely the capacity of an old culvert der a railroad embankment nearby. idence showed that the existing cul- rt probably had never been more an two-thirds full. The new water- y was designed about 25 percent rger to allow for the infrequent ods from very high intensity rain- ll now believed to occur at some me on almost every watershed.

The existing channel made some arp turns immediately upstream om the road, then was forced rough an inadequate culvert, set at ht angles to the road. This struc- re frequently flooded, due partly to e necessity for twisting flow through e culvert, built to fit the road rather an the stream.

To fit the most direct flow of the eam, the new culvert was designed r a skew of 54 deg. with the road- y. The invert grade was established taking elevations on the existing eam for a considerable distance th upstream and downstream from e location and setting the culvert on is grade.

The culvert is composed of three 6- dia. reinforced concrete pipes aced parallel with the axis of the eam and with the center pipe of the lvert set 12 in. lower than the pipes either side.

The approach invert has the same general contour as the downstream invert but its upper edge is raised 4 in. above the hydraulic gradient of the stream. This creates a submerged weir and prevents erosion of the banks at the culvert invert by slowing the velocity of approach slightly. Also, the contour of the approach slab and the difference in grade of the pipe channels the stream flow to its center and prevents high velocity flow at the edge of the channel.

Water funneled to center

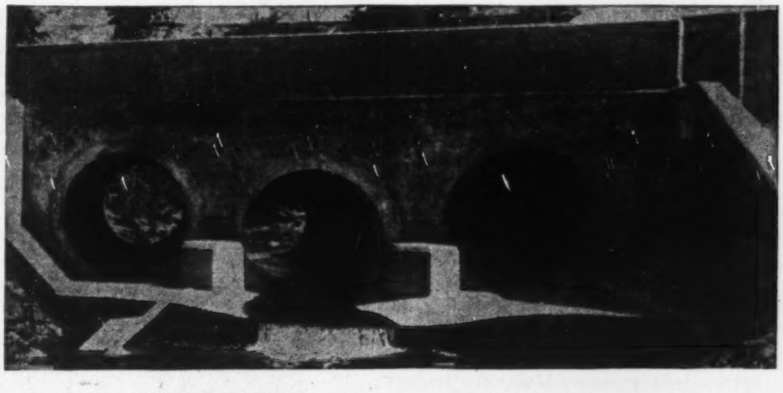
Under actual flow conditions, with the center pipe one-half full (the maximum stage observed to date), the water has a component toward the center of the channel of about 15 deg. starting from a point about 25 ft. upstream from the approach invert. Downstream there is practically no longitudinal flow along the stream banks for a distance of 5 ft. below the downstream invert. Thus, the water is funneled toward the center, increasing in velocity from the edge until at about 25 ft. downstream it again reaches its normal flow.

The width of the culvert is several feet greater than the channel. By making the wingwalls parallel to the stream rather than at an angle, considerable excavation was avoided. Also, if it is necessary to widen the roadway, the wingwalls and the entire structure can be extended at less cost.

The wingwalls are of the gravity type with no reinforcing except dowels at the construction joints, located at the level of the invert. The dowels are long enough to develop bond and resist the overturning moment of the backfill as the walls are not sufficiently heavy above the footing level to resist the thrust from the earth.

The side of the invert adjacent to the wingwalls is sloped to allow the backfill to spill around the end of the wing and produce a natural sloping earth cross section. The value of this slope can be seen in the picture. It will be noted that the sloping invert prevents the backfill from spilling around the edge of the wingwall and over the bottom slab.

The small pier between the culvert openings was designed to guide the water into the individual pipes. Lack of qualified concrete workmen prevented forming the pier to exactly conform to the pipe openings but even as built they act as training walls.



Making the center opening of a three-pipe culvert low keeps the water in the center of the channel, at both low and high streamflow. Wingwalls parallel the stream to save excavation. Note that the sloping invert prevents spill from the toe of the backfill coming on the concrete.

Simple Formulas for Pipe Bends

Peter J. Mascaro
Pittsburgh, Pa.

TIME REQUIRED for the calculation of pipe bends is materially reduced by the use of two formulas recently developed by the writer for his own practice. As engineer of the Power Piping Division of the Blaw-Knox Co., it was felt that an inordinate amount of drafting-room time was required for figuring pipe bends when using the formulas given in the standard piping catalogs.

Simplification was undertaken and two formulas were developed for the general case of an offset bend. These formulas also can be used for angle bends, offset bends with unequal radii, and other forms of bends in one plane. They give a more exact value of the bending angle because only one approximation is involved; both have proved their usefulness in the drafting room of the Blaw-Knox Co. at Pittsburgh.

Statement of formula

Case I—Offset bend with equal radii and the values of R, X and y given (Fig. 1). If y is not given its value can be assumed, but whether given or assumed the value must be greater than or equal to $\sqrt{4\,RX - X}$ The two formulas are:

(*a*) $L = \sqrt{y^2 + X^2 \times 4\,RX}$

(*b*) $\tan\frac{\alpha}{2} = \frac{X}{y + L}$

These formulas are general and can be used in any case, whether $R > X$, $R = X$, or $R < X$.

Case II—Offset bend with equal radii and $L = O$ (Fig. 1). In this particular case the formulas become:

$\tan\frac{\alpha}{2} = \frac{X}{y}$ and $y = \sqrt{4\,RX - X^2}$.

Case III—Angle bend with the values of R, x and y given (Fig. 2). The angle bend can be considered as half of an offset bend and the values of L and $\frac{\alpha}{2}$ can be obtained from formulas a and b (Case I), which in this special case change as follows:

$$L = \sqrt{y^2 + X^2 - 2\,RX}$$

$$\tan\frac{\alpha}{2} = \frac{X}{y + L}$$

where X, y and L are the values for the angle bends as shown by Fig.

Case IV—Offset bend with unequa radii and the values of R_1, R_2, X an y, given (Fig. 3). Formulas a and (Case I) can be used putting in plac of R the mean value of the two radii $\frac{R_1 + R_2}{2}$ The formulas change as fo lows:

$$L = \sqrt{y^2 + X^2 - 4X \times \frac{R_1 + R_2}{2}}$$

$$\tan\frac{\alpha}{2} = \frac{X}{y + L}$$

As given above the formulas are i the forms used in the Blaw-Kno

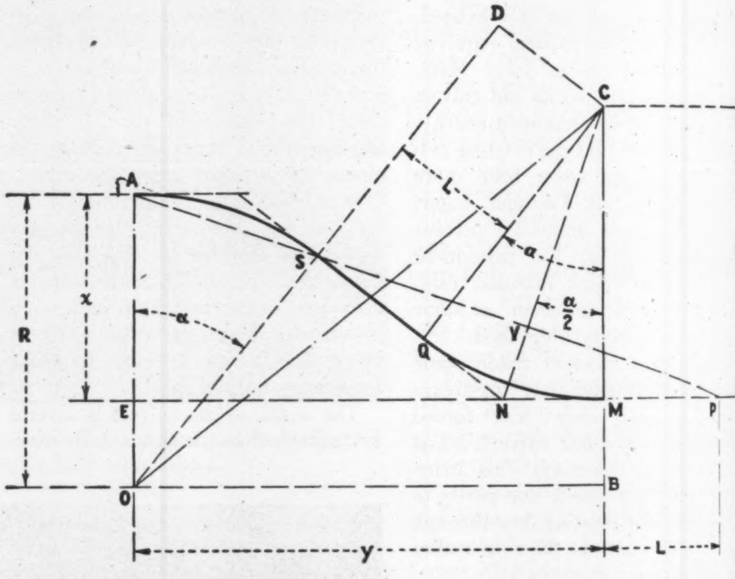


Fig. 4. Derivation of pipe bend formulas used in Blaw-Knox drafting room i based upon the simple diagram above.

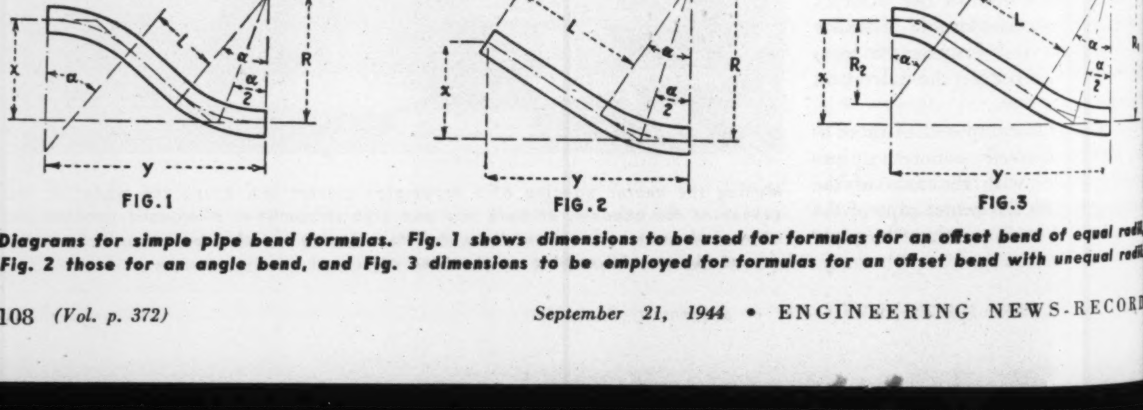


FIG.1

FIG.2

FIG.3

Diagrams for simple pipe bend formulas. Fig. 1 shows dimensions to be used for formulas for an offset bend of equal radi Fig. 2 those for an angle bend, and Fig. 3 dimensions to be employed for formulas for an offset bend with unequal radi

ting room. Their derivation, (re-
ing to Fig. 4) is as follows: Let
be an offset bend of equal radii
X the offset; y the distance be-
n the tangent points A and M; L
straight part of the bend, and a
angle of the bend. It is desired to
the relations between these quan-
and in particular to find L and a
re the other quantities are given.
rom Fig. 4, $BC = CM + MB$.
$CM = R$, $MB = EO = R - X$,
$BC = R + R - X = 2R - X$.
he right triangle OBC the hypotenuse $OC^2 = OB^2 + BC^2 = y^2 + (2R - X)^2$ (1). In the right triangle ODC, OD = 2 R and $OC^2 = (2R)^2 + DC^2 = 4R^2 + L^2$ (2). Substituting this value in (1)

$4\,R^2 + L^2 = y^2 + (2R - X)^2$ or $4\,R^2 + L^2 = y^2 + 4R^2 + X^2 - 4RX$ or $L^2 = y^2 + X^2 - 4RX$ or $L = \sqrt{y^2 + X^2 - 4\,RX}$

Draw the chord AS and continue it until it meets the line EM in P. The two right triangles NVP and NVS are equal having one side NV in common and the two adjacent angles equal. Then $NP = NS$ and deducting the two equal parts NM and NQ, the part $MP = SQ = L$.

In the right triangle AEP, the angle APE is equal to angle NCM because the two sides of the former are perpendicular to the two sides of the latter. But the angle NCM $\frac{\alpha}{2}$ then angle $APE = \frac{\alpha}{2}$ and

$$\tan\frac{\alpha}{2} = \frac{AE}{EP} = \frac{X}{EM + MP} = \frac{X}{y + L}$$

The above relation gives the angle $\frac{\alpha}{2}$ and multiplying by 2 the angle α is obtained.

Vertical Vibration Studies On Golden Gate Bridge

n instrument has been developed
tried out on the Golden Gate
ge at San Francisco for making
cord of vertical vibrations in that
cture caused by winds. Eight of
instruments, called vibration
rders, are to be built, synchron-
and used simultaneously on dif-
nt parts of the structure in order
ake the vertical vibration record
omplete as possible. However, a
le machine was first built and ex-
ments have been made with it
nake sure the design is suitable
the desired results.

e first machine, in a series of
ratory tests, satisfactorily re-
ed on a rotating drum the ver-
movements of a test platform
ing in vertical amplitude from
90 in. and in periodicity from
than 3 to more than 9 sec. Prior
he laboratory tests the instru-
t was placed at the center of the
en Gate Bridge and there con-
ed the expectation that it would
satisfactorily on the 4,200-ft.
ension span. The final labora-
test indicated that with this in-
ment it would be possible to
sure the vertical movement of
bridge deck with an average
r of less than 1 percent.

nding construction of the seven
icate instruments, this first vi-
ion recorder, which in many re-
ts is similar to instruments for
rding seismic disturbances, has
loaned to the San Francisco-
land Bay Bridge for studies on
structure. When all seven in-
ments are ready for operation it is planned to put one at the center of the Golden Gate Bridge span, one at two quarter points, one in each of the two approach spans and two on opposite sides of the main span where they will record any departure from synchronous motion in the two main cables.

The program of carrying out these vertical vibration studies is a joint project of the Public Roads Administration and the Golden Gate Bridge & Highway District. It is under the general supervision of the Committee on Field Observation (Raymond Archibald, chairman) Advisory Board on Investigation of Suspension Bridges, of which E. F. Kelley, Public Roads Administration, Federal Works Agency, is chairman. George S. Vincent, bridge engineer of the Public Roads Administration, represented that organization in the calibration tests on the first instrument which was designed under the supervision of L. H. Nishkian, engineer, Golden Gate Bridge & Highway District. Dr. Perry Byerly, University of California, advised as to the type of instrument to be built and is cooperating with the committee.

In addition to these studies of vertical vibration, some tests have been made and more are planned in measuring the vertical components of winds that strike the bridge. The results of such tests are to be coordinated with the vertical vibration studies in the hope of thereby making possible a more comprehensive analysis of wind effects.

The effect of vertical wind components on suspension spans came into focus sharply during investigation of the Tacoma Narrows Bridge collapse. Since then the subject has been studied to some extent in the large wind tunnel built expressly for bridge model tests at the University of Washington in Seattle. The vertical angle measurements on the Golden Gate Bridge came about largely as the result of work with the large Seattle tunnel and have been made by Prof. F. B. Farquharson, who has charge of the Seattle wind tunnel. This series of studies is not to be limited to the Golden Gate Bridge.

Revised Recommendation For Clay Tiles for Walls

A revision of simplified practice recommendation R61-30 for clay tiles for floors and walls, has been approved for promulgation, according to an announcement by the Division of Simplified Practice, National Bureau of Standards. It became effective Sept. 1, 1944 and will be identified as R61-44.

The recommendation is now broadened to include wall tile trimmers, flat quarry tile, quarry tile trimmers and quarry tile colors, in addition to glazed wall tile and ceramic mosaic. The glazed wall tile sizes remain the same as in the superseded issue, but in the ceramic mosaic there are a number of additional sizes and shapes listed. Considerable reduction in the number of stock sizes and shapes commonly manufactured will be noted.

Until printed copies are available, a limited number of mimeographed copies of the recommendation may be obtained from the Division of Simplified Practice, National Bureau of Standards, Washington 25, D. C.

From Field and Office

WORKING PROBLEMS AND TIME-SAVING METHODS FOR ENGINEERS AND CONTRACTOR

Galvanized Bridge Rail Tried in Minnesota

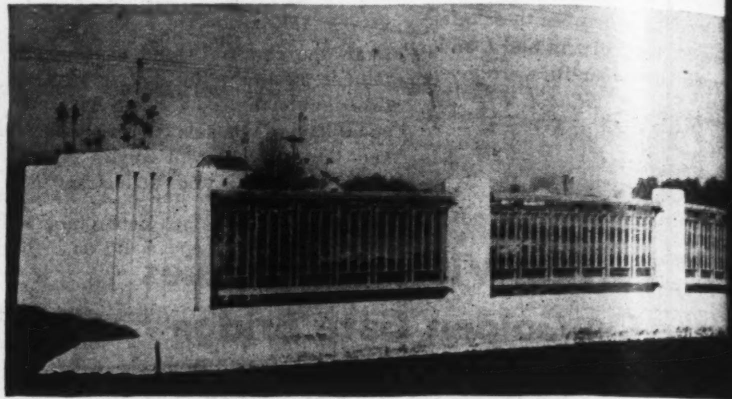
The State of Minnesota Department of Highways has had more or less difficulty over a long period of time with proper protection and maintenance of steel railings on bridges in Minnesota. The difficulty has been especially apparent in the use of steel pipe railing, which in a very short time develops weaknesses in the paint film in the nature of pock marks or blisters. This failure of the protective coating by blistering is attributed to insufficient care taken in the preparation of the railing for painting. The original oil or varnish film placed on the pipe for a protective coating during warehousing is very difficult to remove completely, except by sandblasting or pickling.

In order to eliminate the difficulties in maintenance painting on bridge railings, the bridge department decided to experiment with hot dip galvanizing. After consultation with local firms regarding the possibilities, it was found permissible to specify hot dip galvanizing on bridge railing sections having a length of 9 ft. and a height of 3 ft. 2 in. The department, therefore, specified on the plans for one project "Rail to be hot dipped galvanized as per M.H.D. 3,394 after fabrication, rail sockets included."

The railing treated in this manner, consisting of 28 panels having a total length of 250 lin. ft., is illustrated in the accompanying photograph. It is used on a bridge located on the Lilac Highway immediately west of Minneapolis. The structure was constructed by the Ernest Ganley Co., Inc., Minneapolis, in 1941.

The department at first intended to allow this particular railing to weather one year before applying a final field coat of paint. It has since been decided that the natural galvanizing has weathered to a point rather pleasing with relation to adjacent concrete surfaces, and maintenance painting has been eliminated.

The department plans to continue this method of protective coating for a portion of Minnesota steel bridge railings when construction can again be resumed.—E. J. Miller, *Bridge Engineer, State of Minnesota Department of Highways, St. Paul, Minn.*

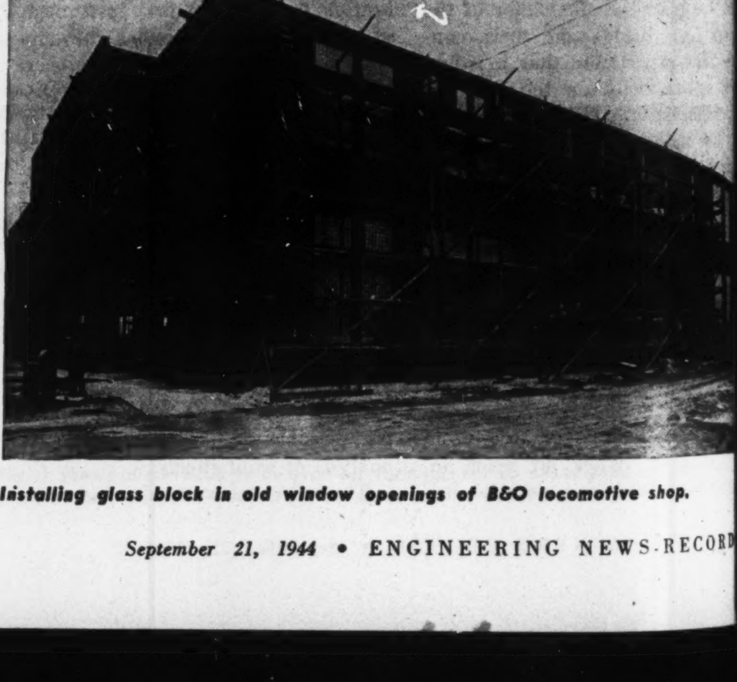


Appearance after one year of weathering of hot-dipped zinc galvanized ha railing used on a Minnesota bridge.

Glass Block Replaces Sash in Engine House

Faced with frequent breakage of glass panes, the difficulty of keeping them clean and the necessity for periodic painting of the steel sash, the Baltimore and Ohio Railroad Co. has recently closed all of the window openings in its Cumberland, Md., locomotive repair shop with glass block.

After removing the old sash, concrete sills were poured in place o top of existing sills to provide a leve surface for the block. Instead o cutting back into the old masonr walls to form chases, wood chase were erected. Window openings wer adapted to the size of the block b varying the thickness of the woo members, which were anchored t the masonry walls with expansio



Installing glass block in old window openings of B&O locomotive shop.

Because of the size of some openings, wood mullions were to give support to the panel. ll wood sash were set into most of upper and lower panels for lation.

cording to C. B. Harveson, engi- maintenance of way, "More comble working conditions, better ing and cleanliness, plus the fact workmen are not distracted by is going on outside the building, increased efficiency as much as rcent."

construction work was carried by the Steiner Construction Co. ltimore.

lt Tightening for Timber Structures

ithin 3 to 4 months after a timber ture is erected, it should be gone completely and bolts throughout ened. At successively lengthening vals or until the lumber has hed moisture stability, which will due to moisture and heat, inspec- and tightening should be re- d (See also "Are Timber Checks Split Serious?" *ENR*, July 27, , vol. p. 110, reprints of which be obtained from National Lum- Mfg. Assn.)

ery bolt should be tested with a ch to determine individually that tight. A regular spud wrench sufficient length to tighten bolts erly with a normally strong pull. pipe is used to lengthen the han- care must be exercised not to strip olt threads.

raw all timbers into full contact at joint. Where this is difficult, due arping or shrinking of lumber, aged or rusty bolts or rings out lignment, proceed slowly. Make that the ring is properly placed in routing to avoid damaging tim- A little oil on threads, in advance lt tightening, works wonders.

l the nuts at a single joint should ghtened a small amount in rota- and the operation repeated as as necessary to close the joint. If does not close readily part of the should be taken up and the joint ed to "rest" for some hours or night.

may be helpful to reverse one or of the bolts at a joint, thus per- ing tightening on both sides sim- neously, A regular hand sledge should be used to strike the head of the bolt while the nuts are being pulled up. Extra bolts may be needed to pull the joint tight without excessive strain. In some cases two or three steel "C" clamps can be used effectively to bring warped joints together.

If pressure on the nut causes the washer to "bite" into the wood before the joints "pull up," substitute $\frac{3}{8}$ by 4-in. square washers under both head and nut. A "horseshoe" washer with an opening to the edge may be placed under the head of the bolt without removing the bolt; safety requires a nail through the washer.

Shrinkage cracks or minor splits in wide thin members may be counteracted by bolt and plate collars or side plates and cross bolts. Stitch bolts through the width of thin members are often undesirable as they may require removal of too large a percentage of the net cross section of the member.

The work crew should chalk-mark all bolts as they are tightened to avoid skipping. After the tightening is completed, it may be desirable to spot paint bolt heads, washers and nuts, especially in seacoast locations, to protect them from rust.

All bolt tightening, even minor repairs, on timber structures should be under the supervision and inspection of experienced engineers.

The above was briefed from instructions for field men prepared by Verne Ketchum of Timber Structures, Inc. —THE EDITORS.

Field and Office Comment

Simplified Cube Root

Sir: In *Engineering News-Record* May 18, 1944, p. 763, appears an article "Accurate Cube Root" by Charles Herrick, at the end of which reference an example is given to a method used by me, as set forth in your January 13, 1944 issue, p. 56.

While not wishing to enter into any controversy, it appears to me that Mr. Herrick has made two mistakes in arithmetic in the solution of

$41.4\left(1 + \frac{1}{3}\frac{257.736}{41.4^3}\right)$ which is correct as stated.

First: The solution of the fraction

$$\frac{257.736}{3 \times 41.4^3} = \frac{257.736}{3 \times 70957.94} = \frac{257.736}{212{,}873.82}$$

or by slide rule $\frac{258}{213000} = 0.00121$, not 0.012 as indicated by Mr. Herrick's figures.

Second: Mr. Herrick failed to multiply as indicated .00121 x 41.4 = 0.05009 before adding to 41.4 41.4 + .05009 = 41.45009, which is about 0.00003 from the exact root.

If the above are the correct figures, I should appreciate a correction to the test given by Mr. Herrick.

C. W. RAYNOR
Structural Engineer
Bureau of Buildings
Portland, Oregon

Sir: Working against a stop watch must have made me nervous, hence the mistakes which Mr. Raynor has found in my attempt to use his method for extracting a cube root, as outlined in the letter above. He should have told me how long it takes to solve his equation. This would have relieved me of the trouble of performing such an arduous computation.

Now that the arithmetic has been thoroughly checked, it is evident that the error of 3 in the seventh significant figure must be due to deficiencies in the equation. Mr. Raynor should have given the derivation of his equation, and computed the errors due to neglecting all but the first two terms of the infinite series that results when a binomial is expanded by the Binomial Theorem.

Most people forget how to perform cube root by the arithmetical method. The "simplified" methods that have been proposed are complicated and difficult to remember. Logarithms provide a quick, accurate and easily remembered method of performing cube root. This method requires three steps only:

1. Look up the logarithm of the number.
2. Divide this by three.
3. Look up the number corresponding to the resulting logarithm.

To focus attention on the important point, with logarithms, cube roots may be obtained in the following times; to 4 places in 50 sec., to 5 places in $1\frac{3}{4}$ min., to 7 places in $2\frac{1}{2}$ min., and to 10 places in 7 min. The danger of mistakes is minimized by this simple method.

CHARLES HERRICK,
11 East 32d St.,
New York, 16, N. Y.

Simple Marking Devices Speed Drafting Operations

The simple marking devices illustrated in Figs. 1 and 2 have been found of great value in placing the points and figures for long street plan and profile surveys where many different structures must be shown, sometimes in distinguishing colors.

A gadget developed to guide the scaling and drafting of the plan view is shown by Fig. 1. In this drawing *C* is a card of about card board thickness on which is drawn a center and offset lines to required scale, *B* is a triangle thumbtacked or lightly spot cemented to the card, and *A* is a steel straightedge placed so as to allow the card to slide upon the profile or cross-sectioned paper with the center line or datum line of the card kept coincident with that of the drawing. When the left hand edge of the card is slid to a station marking on the drawing, it accentuates the offset line and scale divisions for pricking points taken from the level or transit book for that station. It also eases the drafting of all short plan lines parallel to the center line, since for that purpose a small triangle may be "set-squared" against the vertical edge of triangle B as fast as the appropriate points are plotted.

A lined and slotted card guide for inserting station elevation figures for the profiles is illustrated by Fig. 2.

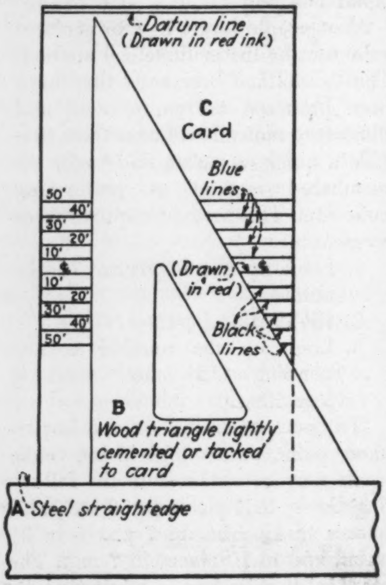

Datum line
(Drawn in red ink)
C
Card
Blue lines
50'
40'
30'
20'
10'
¢
10'
20'
30'
40'
50'
(Drawn in red)
Black lines
B
Wood triangle lightly cemented or tacked to card
A Steel straightedge

Fig. 1. When drawing plan view of street layouts a wooden triangle attached to a stiff card marked as above will simplify the work.

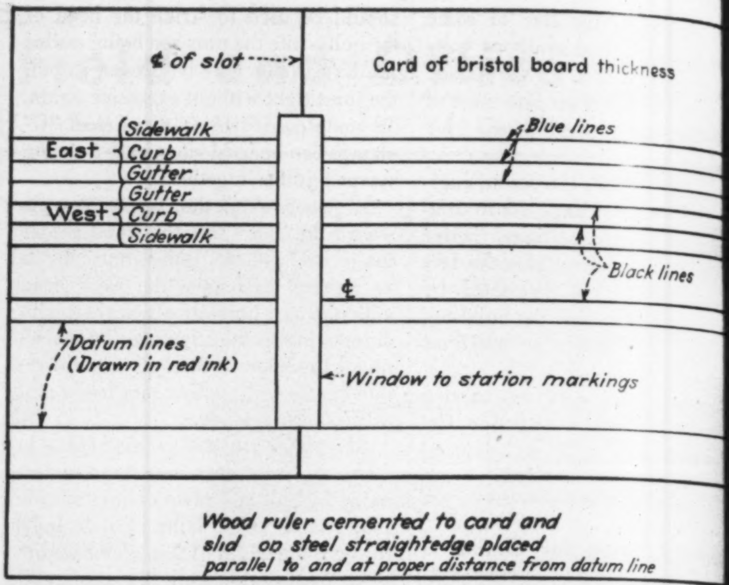

¢ of slot
Card of bristol board thickness
Sidewalk
East
Curb
Gutter
Gutter
West
Curb
Sidewalk
Blue lines
Black lines
¢
Datum lines
(Drawn in red ink)
Window to station markings
Wood ruler cemented to card and slid on steel straightedge placed parallel to and at proper distance from datum line

Fig. 2. A card guide may be of value when inserting station elevation fig on profile drawings.

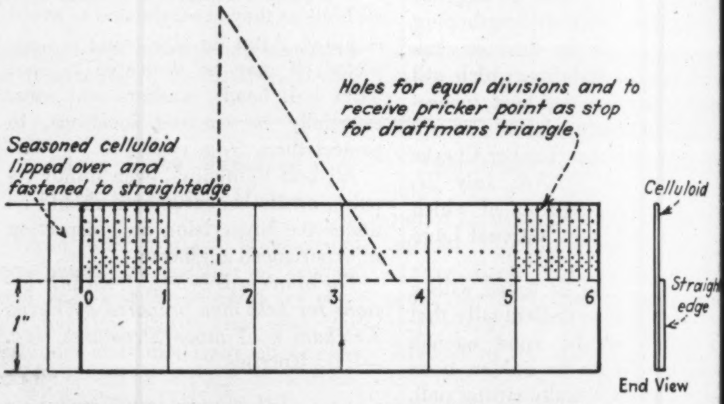

Holes for equal divisions and to receive pricker point as stop for draftmans triangle
Seasoned celluloid lipped over and fastened to straightedge
Celluloid
Straigh edge
0
1
2
3
4
5
6
1"
End View

Fig. 3. Perforated diagonal scale of this type is helpful in accurately spaci lines on small scale drawings.

The center line of the slot having been brought to the station for any particular survey items, the positions and colors for their insertion are at once identified. This scheme is best adapted for profiles where the station plus signs and the decimal points of the figures are taken as location markers and references, all numbers being written from left to right on the sheet.

Fig. 3 illustrates a perforated diagonal scale which in combination with a set square is fitted for accurately and semi-automatically spacing lines on small scale work and for laying off lettering guide lines.

I should also like to suggest that the work of plotting and scaling (on and from) large scale survey work sheets could be helped greatly if cross-sectioned tracing cloth or paper subdivided and indexed to match t engineer's scales were manufacture A subdivided tracing sheet of th sort could be accurately superimpose on, for example, a grid 500 ft. on side to a scale of 30 ft. to an inc with big advantage for finding an measuring distances within that are

The draftsman who wants to li up cross-sectioning on tracing pap for this work will find some of th commercial squared paper servic able for spacing the inch division Sharp lines may be transferred b using carbon paper and a needle poi scriber. The latter can be prevente from scratching by holding it slan wise to the work or by using a prote tive piece of tracing cloth.

DANIEL D. MOLO
Staten Island, N.

Tournapulls are quickly pusher loaded. Single pusher easily handles loading of 3 or 4 Tournapulls, depending on haul length.

HOW TO REPLACE OBSOLETE RIGS and *Reduce Equipment Investment*

USE FAST-MOVING TOURNAPULLS . . . You'll Load, Haul and Spread with Same Rig . . . Move More yardage Faster and at Less Equipment and Labor Cost

With Tournapulls you get Carryall Scraper digging and spreading efficiency plus truck hauling speeds. You eliminate such one-purpose tools as shovels and elevating graders for loading, trucks for long hauls, and special spreading tools on fills. Result: you cut equipment investment almost in half, move more yardage with fewer operators and fewer units.

MORE POWER FOR WEIGHT

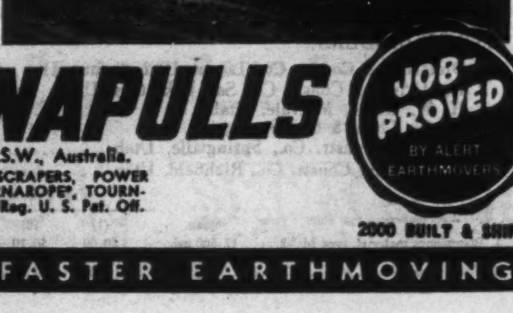
The Super C Tournapull has 150 h.p., yet weighs but 31,000 lbs.—22,500 to 39,000 lbs. less than crawler-scraper outfits of comparable output capacity. And Tournapull design centers that weight and power on two big rubber-tired drive wheels to give you maximum traction and flotation for tough grades and soft underfoot conditions. These big drive tires have practically no wearing parts, reduce your maintenance costs and downtime by cushioning equipment against shock.

HAUL FROM 300' TO 3 MILES PROFITABLY

What's more, the Super C operates at 2.6 to 14.9 m.p.h.—2 to 3 times faster than the fastest crawling tractors. With it you can move dirt cheaply on both long and short hauls—from 300' to 3 miles.

Why use slow-moving, overweight equipment when you can move more yardage, more profitably with faster-moving, job-proved Tournapulls? Talk to your LeTourneau dealer NOW about replacing obsolete equipment with faster-powered Tournapulls.

Tournapulls spread their own loads on the move. Smooth fills and good haul roads, as shown here on Mannix & Company's job near Banff, Alberta, enable you to get into high gear quicker and stay there, thus increase hourly trips and yardage.



TOURNEAU TOURNAPULLS

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BY ALERT EARTHMOVERS

Also LeTOURNEAU (Aust.) Pty., Ltd., Rydalmere, N.S.W., Australia.
Manufacturers of TOURNAPULLS*, DOZERS, CARRYALL* SCRAPERS, POWER CONTROL UNITS, ROOTERS*, SHEEP'S ROOT ROLLERS, TOURNAROPE*, TOURNATRAILERS*, TOURNAWELD*, TOURNACRANES*. *Trade Mark Reg. U. S. Pat. Off.

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UBBER-TIRED POWER FOR FASTER EARTHMOVING

CONTRACT UNIT PRICES

What contractors are bidding on different kinds of construction work

STREET SURFACING, KANSAS CITY, MO.

OWNER: City of Kansas City, Mo.

PROJECT: Resurfacing old streets with asphaltic concrete wearing surface in Kansas City as follows: Wornall Road between 63rd and 75th Streets; Prospect Avenue between 39th Street and Swope Parkway; and 15th Street between Jackson and Van Brunt Boulevard. Contract involves asphaltic wearing surface, and cleaning, tacking, sealing and chipping pavement.

CONDITIONS: Contractor to furnish all materials and complete work in 60 calendar days. Rail and highway transportation facilities available. Wage rates in Kansas City are: $1.40 to $1.65 per hour; semi-skilled, 95c. to $1.375; and common, 90c.

BIDS: Five bids were received July 5, 1944, ranging from the contract low of $53,240 to $75,708.

LIST OF BIDDERS:

1. Mid West PreCote Co., Kansas City, Mo. (contract)	$53,240
2. Tobin Asphalt Products, Inc., Kansas City, Mo	59,519
3. Bowen Construction Co., Kansas City, Mo	59,528
4. Musselman & Hall, Kansas City, Mo	72,280
5. Blue Valley Asphalt Co., Kansas City, Mo	75,708

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Asphaltic concrete, in place	6,780 ton	$6.69	$7.45	$7.23
2. Pavement cleaned, tacked, sealed and chipped	75,064 s. y.	.105	.12	.14

OVERPASS AND APPROACHES, UTAH

OWNER: Utah State Road Commission, Salt Lake City, A. L. Anderson, state road engr.

PROJECT: Construction of concrete T-beam overpass structure 273.6 ft. long and 0.644 miles of approach-road surfacing, 26-ft. wide, on Plain City-Hot Springs Road, Box Elder County, approximately 12 northwest of Ogden, Utah. Approach-road surfacing is road-mixed bituminous material.

CONDITIONS: Contractor to furnish all materials and complete work on overpass in 150 calendar days and on road in 175 calendar days. Rail and highway transportation facilities available. Wage rates are: skilled labor, $1.25 to $1.50 per hour; semi-skilled, $1.00 to $1.12½; and common, 75c.

BIDS: Six bids were received June 23, 1944 on the overpass structure, and six on the roadway items. Overpass bids ranged from contract low of $57,690 to $83,735. Engineers estimate, $79,481. On the roadway, bids ranged from $66,968 to $79,424. Engineers estimate, $65,733.

Roadway

LIST OF BIDDERS:

1. Olof Nelson Constr. Co., Logan, Utah (contract)	$66,968
2. R. M. Jensen Constr. Co., Salt Lake City, Utah	69,245
3. H. W. Glenn, Midvale, Utah	72,624
4. W. W. Clyde & Co., Springville, Utah	72,854
5. Reynolds Constr. Co., Springville, Utah	79,217
6. L. A. Young Constr. Co., Richfield, Utah	79,424

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Bituminous material, type MC-2	17,500 gal.	$0.09	$0.10	$0.15
2. Bituminous material, type RC-5	2,900 gal.	.09	.10	.16
3. Cover material	140 ton	3.00	3.00	4.00
4. Scarifying and mixing	0.592 mi.	750.00	800.00	1,800.00
5. Scarifying and mixing paved shoulder and embankment gutter, 9-ft. wide	0.311 mi.	750.00	1,200.00	1,
6. Cr. rock or cr. gravel surf. course	5,150 ton	.85	.85	
7. Gravel or cr. rock base course	4,700 ton	.85	.85	
8. Unclassified excavation	116,300 c. y.	.22	.22	
9. Overhaul, Class A	705,000 sta. y.	.015	.015	
10. Overhaul, Class B	87,000 y. mi.	.15	.15	
11. Channel excavation	75 c. y.	1.00	1.25	
12. Watering	1,830 M gal.	1.50	1.80	
13. Rolling	1,565 hr.	8.50	4.00	
14. 18-in. concrete pipe	87 l. f.	3.00	2.50	
15. Excavation for structures	50 c. y.	1.00	1.50	
16. Guide posts	54 ea.	5.00	6.00	
17. Right-of-way fence, type A	2,100 l. f.	.20	.18	
18. Moving fence	250 l. f.	.15	.10	
19. Removal of existing pavement	2,000 s. y.	.75	.75	
20. 16-ft. gates	3 ea.	25.00	25.00	
21. Federal-aid project markers	2 ea.	20.00	20.00	

Overpass Structure

LIST OF BIDDERS:

1. S. E. Faddis Constr. Co., Salt Lake City, Utah (contract)	$57
2. Merrill & Lauch Constr. Co., Ogden, Utah	6
3. Young & Smith, Salt Lake City, Utah	7
4. Olof Nelson Constr. Co., Logan, Utah	7
5. L. A. Young Constr. Co., Richfield, Utah	7
6. Ora Bundy & Co., Ogden, Utah	8

Item	Quan.	Unit Prices (1)	(2)
1. Excavation for structures	450 c. y.	$2.30	$4.00
2. Concrete, Class A	1,210 c. y.	28.00	30.00
3. Concrete handrail	596 l. f.	4.00	7.50
4. Structural steel	3,500 lb.	.26	.20
5. Reinforcing steel	235,000 lb.	.055	.055
6. Piling, treated	4,200 l. f.	1.43	2.00
7. 6-in. perf. corr. galv. metal pipe underdrains	92 l. f.	.73	1.25
8. 6-in. corr. galv. metal pipe	288 l. f.	.72	1.25
9. Furn. pile driving equipment	Lump Sum	275.00	500.00

WATER MAIN, CLEVELAND, OHIO

OWNER: City of Cleveland, J. H. Hamlin, engineer.

PROJECT: Furnishing pipe and constructing 42-in. st water main for Spruce Avenue Water Main, Cleveland, Oh Also involves salvaging approximately 830 ft. of 42-in. c iron water main as specified by the engineer.

CONDITIONS: Contractor to furnish all steel pipe and co plete that portion of the work in 30 calendar days. Thi days also allowed for salvaging cast iron pipe. Rail, highw and water transportation facilities available to Cleveland, a highway facilities available to site of work. Wage rates spe fied are: hoisting engineers, $1.875 per hour; and comm labor, $1.035 per hour.

BIDS: Nine bids were received April 28, 1944 ranging fr the low of $55,596 to $107,800.

LIST OF BIDDERS:

1. Lake City Constr. Co., Shaker Heights, Ohio (low bidder)	$55,5
2. Kalill Co., Cleveland, Ohio	60,
3. Domenic Nero Constr. Co., Cleveland, Ohio	63,
4. D. M. Sylvester & P. DiPaolo Constr. Co., Cleveland, Ohio	64,
5. National Construction Co., Cleveland, Ohio	67,
6. Herkner Constr. Co., Cleveland, Ohio	73,
7. Said S. Haddad, Cleveland, Ohio	84,
8. Fred Haddad, Cleveland, Ohio	92,
9. Curro Construction Co., Cleveland, Ohio	107,

Item	Quan.	Unit Prices (1)	(2)
1. Furnish and construct 42-in. steel water main	1,140 l. f.	$44.00	$46.95
2. Salvage 42-in. cast iron water main	830 l. f.	6.00	8.85

OVER THERE
WIRE ROPE MUST
FIGHT
TO THE FINISH
Enemy wire rope
OVER HERE
WIRE ROPE MUST
STICK
TO THE FINISH

Our troops inspect a captured Axis tank, looking for booby traps
INTERNATIONAL NEWS PHOTO

Every battle is a showdown . . . our men, weapons and equipment against the enemy's . . . *wire rope* included. That's why our forces need the best rope they can get . . . *and lots of it.* Below are some of the ways in which *you* can help to send more wire rope over there by making your own rope *last longer* over here:

1. Start with the correct wire rope. If uncertain about size, grade or construction for your specific job, ask us or any distributor.

2. Check equipment thoroughly. Repair or replace worn, corrugated or wobbly sheaves. Line up sheaves with each other and with drums, making sure rope does not rub against flanges. Inspect drums for roundness.

3. Install rope carefully. Avoid kinking when unreeling and handling. Never drag rope across concrete or gravel. Wrap rope snugly and evenly on drum, avoiding cross-winding.

4. Break in rope cautiously, gradually increasing speeds and loads. And break in the operator, if inexperienced. Instruct him in the importance of smooth starts and stops . . . reasonable loads . . . frequent examination of rope, sockets, clips and splices.

5. Care for your rope. Clean and lubricate regularly. On many installations rope can be cut off or shifted to distribute wear. Get better acquainted with ropes by sending for our free Industrial Wire Rope Hand Book and Riggers' Hand Book.

One thing more: Use wire rope of known stamina and dependability. *Preformed* Yellow Strand combines flexibility, toughness, elasticity and strength in proper balance. It stays on the job . . . curtails replacements . . . helps you keep manpower and equipment producing . . . for Victory.

Broderick & Bascom Rope Co., St. Louis

Branches: New York, Chicago, Houston, Portland, Seattle
Factories: St. Louis, Seattle, Peoria

BRODERICK & BASCOM

YELLOW STRAND

PREFORMED WIRE ROPE

WYTEFACE
"A"
TRADE MARK
STEEL TAPES

K&E
REG. U. S. PAT. OFF.
I'LL TAKE THE WHITE ONE EVERY TIME!
3
4

GRADUATED IN INCHES OR TENTHS

EASY-TO-READ, *raised* black graduations on crack-proof white surface . . . resist abrasion from rock, sand, scraping over rails, pipe, concrete, etc. In all sizes and types—in cases or reels. Ask your dealer—or write for catalog.

EST. 1867
KEUFFEL & ESSER CO.
NEW YORK • HOBOKEN, N. J.
[illegible]

NEW AIDS TO THE CONSTRUCTOR

Plywood Tubing

Fabricated from thin veneers and a thermosetting synthetic resin, "Plytube," a new plywood tubing, is built up so that stress or strain in any direction will act upon the total columnar grain fibers of the veneer layers. Urea formaldehyde is now its bonding agent, but the more critical phenol may also be used. Plytube is said to be water-, flame-, splinter- and rot-proof. If coated, Plytube will carry chemicals, gasoline and oil. It can be threaded on the job with ordinary pipe dies.

Plytube is available at this time with inside diameters from ½ in. to 18 in.; wall thicknesses from .05 in. to .50 in.; in any reasonable length. However, tubes ¼-in. O.D. to 24-in. O.D. have been made and the manufacturer is building an automatic winding machine to produce tubing endlessly. Plytube has been used for sectional life raft oars, motor shafts, radio antenna masts up to 90 ft. high, ship railings, and oil reservoirs, as well as construction beams, columnar posts, etc.—*Plymold Corp., Lawrence, Mass.*

Boom Stop Control

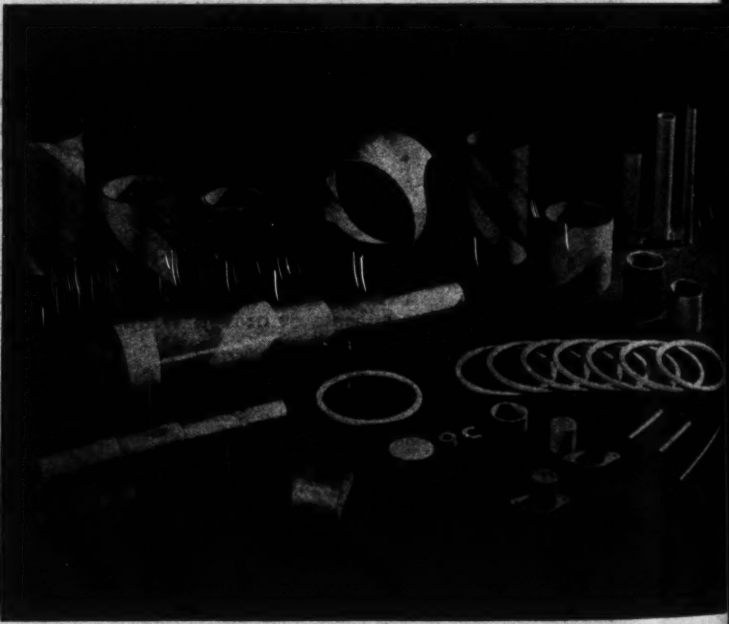
Preventing a crane boom from risi beyond safe elevation, a new Thom automatic boom stop control, air vacuum-driven, disengages the ma drive clutch instantly when the boo is raised above safe limits. The contr valve is mounted on the cab frame line with one boom leg; its operati causes the spring-loaded clutch boost cylinder to stop further boom raisin

This control stops the boom witho shock, the manufacturer states, a thus places no dangerous strains on i —*Industrial Equipment Co., 59th a Doyle Sts., Emeryville, 8, Calif.*

• • •

Gear-Flush System

Developed to provide maximum spe in flushing dirt from marine reducti gears, the new Winslow Giant-Flo sy tem has a battery of large-capaci filters inserted directly in the mai lubricating oil line. The filters are co nected together in parallel by integr inlet and outlet manifolds, the filter el



igging An Axis Grave

American Bullgrader
ging, literally, an Axis
ve is symbolic of the
s dirt-moving equipment
s done to speed com-
te Victory. On every
nt, the work of bull-
zers, Dozershovels, scrap-
, etc., hastens the final
neral of the frenzied
natics.

every front, too, Bucy-
-Erie tractor equipment
e the Bullgrader above is in the thick of it.
utstanding as always, now it is helping pre-
re the Axis burial.

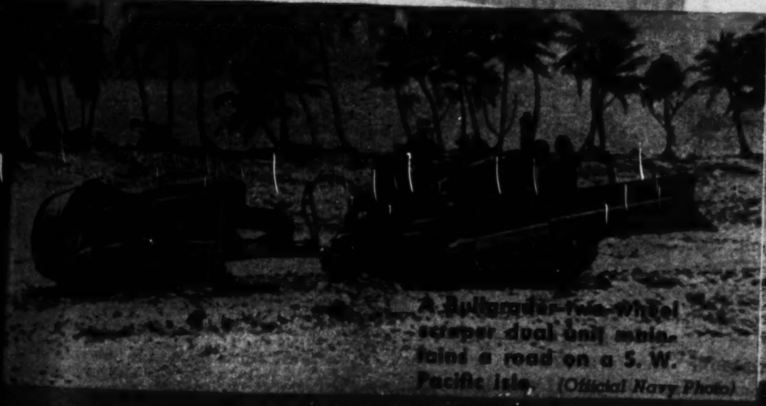
N-71C

A Bullgrader digs a burial place for dead Japanese.

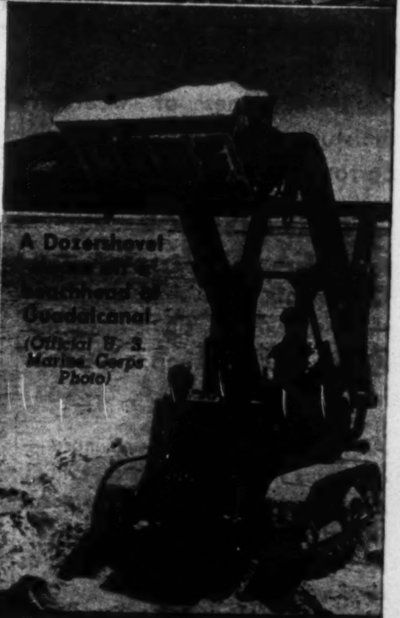
A Bullgrader begins preparing a road at Tarawa. *(Official U. S. Marine Corps Photo)*

Most of our production must still go to our armed forces; a limited number of machines is, however, now available for high priority civilian operations. Be sure to see your International TracTracTor Distributor for information on new machines, rentals, and service.

UCYRUS-ERIE CO., SOUTH MILWAUKEE, WISCONSIN



A Bullgrader-two-wheel scraper dual unit maintains a road on a S. W. Pacific isle. *(Official Navy Photo)*



A Dozershovel [illegible] on a beachhead at Guadalcanal. *(Official U. S. Marine Corps Photo)*

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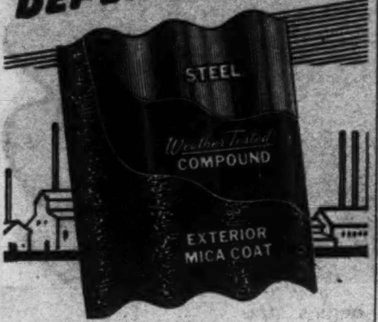
3 REASONS for its DEPENDABILITY



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Light, strong, rigid, easily handled.

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Resist extremes of weather, moisture, acid fumes, salt-air corrosion, etc.

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Ornaments and adds protection. Attractive silver-gray finish needs no upkeep, no painting!

All these advantages — and more — are yours if you use APS PLASTEEL Roofing and Siding. Available for immediate shipments in standard corrugations for industrial as well as farm use.

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General Office and Plant,
WASHINGTON, PA.

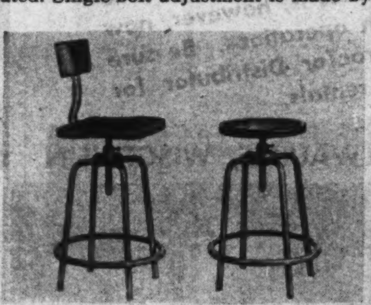
ment cases are steamjacketed to raise the oil temperature to approximately 140 deg. F.

Each Winslow oil conditioner contains 57 individual filtering elements, with a total area of more than 4,700 sq. in. Model J-57-930-A flushing unit handles 75 gpm. of SAE 30 oil.—*Winslow Engineering Co., Oakland, Calif.*

• • •

Industrial Chairs and Stools

Featuring all-welded steel frame for strength, a new line of chairs and stools emphasizes comfort and efficiency for industrial workers. Protruding bolts and other sharp surfaces have been eliminated. Single-bolt adjustment is made by means of a sliding tube in each leg; these tubes are zinc plated and punched at intervals to receive the adjusting bolt.



Properly curved backrests are mounted on spring steel uprights, which adjust up and down for support and good posture. Seats of non-splintering Masonite are furnished in scroll or round type.—*Royal Metal Mfg. Co., Chicago, Ill.*

• • •

Three-Way Foot Valve

Useful on tools where operators should have both hands free, a new compressed air foot valve speeds handling of work. Furnished in locking and non-

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Worthington Pump and Machinery Corp.

$550,000,000 READY FOR CONTRACT

Behind the Fighting Fronts with

BLUE BRUTES

From the Alaskan highway to swamp-ridden Australian jungles, Blue Brutes are at work today. The same rugged, trouble-free performance that helped push the roads through to fighting fronts . . . that went to work in hundreds of Army Camps, Navy Yards, air bases here at home . . . will be *yours* when war's won, to win the peace that will follow.

New, streamlined Blue Brutes will also be ready when Victory gives the green light to city budgets.

A rough estimate of advance plans of cities under 1,000,000 population shows $550,000,000 of improvements ready for contract, $1,600,000,000 being surveyed, and $3,780,000,000 being studied.

Whatever the job, you'll need rugged, dependable air compressors like the Worthington Blue Brute 210-footer shown above.

Exclusive features — years of engineering experience — make Blue Brutes save *your* time and money.

Feather Valves*, for instance, lightest, strongest, most efficient valves ever designed for air compression — full force feed lubrication — 3-point suspension, "cradling" engine and compressor — features like these knock downtime *down*, speed the job, avoid delays that threaten profits.

In brief, Blue Brute compressors deliver *more* air. Blue Brute air tools use *less*. And the complete line . . . Diesel, gasoline or electric driven compressors . . . tools for *every* purpose . . . means you'll get the right equipment for the job.

Your nearest Worthington representative will help you choose Blue Brutes to fit your post-war plans. Act now! Your nearest distributor is listed on page 118.

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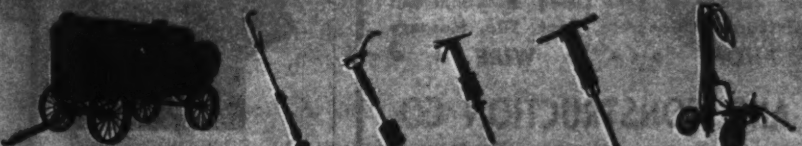

Compressors from 60 to 500 cu. ft. capacity in mountings to suit all jobs. Rock Drills and Air Tools that have always set the pace for easy operation — available in a wide range of weights and sizes.

WORTH WORTHINGTON

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STREAMLINED STRENGTH
Fuller
TRANSMISSIONS

The gear teeth in your Fuller transmission may not be shaped like the tear-drop . . . the root from which all streamlining stems, but in practice they are similar. In their research, Fuller engineers sought a design which would provide simplicity, strength, and resistance to wear, plus smooth, quiet gear-meshing. The resultant streamlining of the Fuller gear tooth, as radical a departure from standard practice as the streamlined train, is the reason why Fuller transmissions run quietly, shift easily and wear longer.

FULLER MANUFACTURING COMPANY, KALAMAZOO, MICHIGAN
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For ● Steel Plate Lining ● Steel Encasement ● Building Walls, Roofs, Facings ● Tunnel Lining ● Water Reservoir Lining ● Power Plants — Bunker Lining ● Sewer Repairs ● Tank Lining ● Canal and Ditch Lining ● Repairs of Disintegrated Concrete, Brick, Tile, Masonry

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locking types, the valve mechanis simple. An adjustment of the l

locking device prevents engagement the operating pedal, and changes locking type to nonlocking.

The ruggedly constructed valve h heavy cast iron body and neoprene va seat; its net weight is 12½ lb.—*Ke Tool Co., Grand Haven, Mich.*

• • •

Bronze Water Meters

With the resumption of water me manufacture under amendment to W Order L-154, it is announced that line of Empire "Streeemline" water m ers has been expanded. This bro cased meter is now available in ⅝ i ⅝x¾ in., ¾ in. and 1-in. sizes.

The same general construction is u for all sizes, embodying a balanced cillating piston operated in a two-pa snap joint measuring chamber, and oil-enclosed gear train. All workin parts are assembled without screws bolts.

A breakable cast iron bottom pla provides frost protection, it is claime by permitting interior castings to sep rate to relieve parts from strain and di tortion.—*Pittsburgh Equitable Met Co., 400 North Lexington Ave., Pitt burgh 8, Pa.*

• • •

Small Pipe Gage

Now modified to measure all sizes electrical conduit and metallic, thi wall tubing as well as pipe from ⅛ i

to 12 in., the latest model of the Three Point Gage is of steel, with black rust proof finish. The deeply etched num-

put SAFETY FIRST
in Road and
Street Construction

"The United States cannot afford—socially or financially—the tragic waste represented by the 39,969 traffic deaths in the last pre-war year of 1941."*

Traffic safety has gained tremendously in importance. It was recently made the postwar aim of some 40 prominent national organizations, as announced through the National Safety Council. Officials who put Safety First in their maintenance and construction will receive the thanks and blessings of everyone.

Worn-out roads and streets will have to be reconditioned hurriedly . . . new arteries constructed without delay . . . to handle the expected, increased postwar traffic *safely!*

To put Safety First in postwar construction . . . and put it there quickly . . . use up-to-date equipment — fast-moving Allis-Chalmers tractors and Motor Graders, powered with General Motors 2-Cycle Diesel engines. Only modern machines can do the job right, in shortest time, at lowest cost! Consult your Allis-Chalmers dealer about your future equipment needs!

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****Kenneth D. Colman, Seattle, Washington, businessman, head of a special committee that drafted postwar safety program for 40 national organizations. Sponsoring groups represented business and industry, labor, agriculture, war veterans, women, police, public officials and professional agencies interested in safety.***

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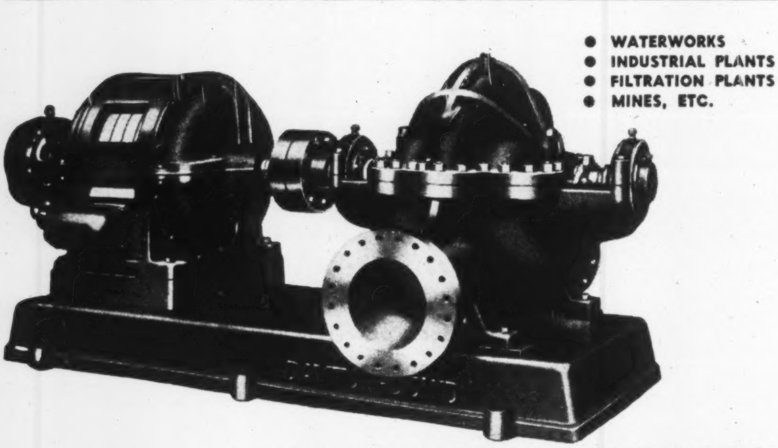

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- INDUSTRIAL PLANTS
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FOR GENERAL CONTINUOUS DUTY PUMPING SERVICE

TYPES — Single stage, single suction, sizes 2" and 3". Single stage, double suction, sizes 2½" to 42". Capacities up to 60,000 G.P.M.

SPLIT CASE DESIGN — For easy accessibility. Available in either cast iron, chrome iron cast steel, bronze, monel and other alloys.

IMPELLER — High efficiency design. Made of cast bronze. Also available in KA-2 stainless steel, cast carbon steel monel or other alloys.

DRIVE UNITS — Pumps can be supplied with dual drive hookup. Electric motor and steam turbine. Electric motor with gas engine. Twin pumps also available with one electric motor.

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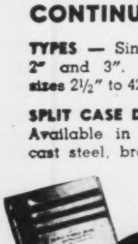


DAYTON-DOWD
Turbine Pumps • Centrifugal Pumps

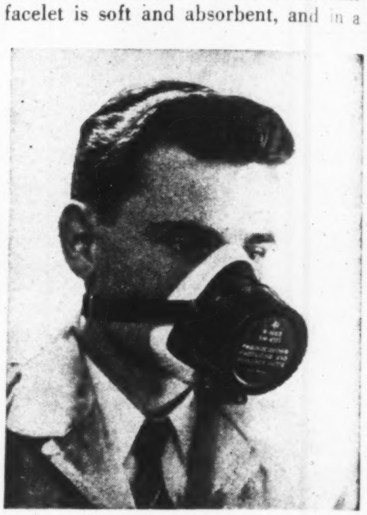
erals are filled in with white enamel.

This pocket size patented device measures 2¾x4½ in., and is available with or without a leatherette case. The gage functions in the same way as earlier models.—*Three-Point Gage Co., 3821 Broadway, Chicago 13. Ill.*

• • •

Respirator Facelet

A respirator is said to be more comfortable to wear when it is equipped with a new knitted cotton facelet. This facelet is soft and absorbent, and in a measure protects the face against dust and dirt, according to the manufacturer's statement.



Designed for use with a R-1000 respirator, this AO facelet will fit most standard respirators.—*American Optical Co., Southbridge, Mass.*

• • •

Plastic Tape

Highly flexible and elastic, a new many-purpose plastic tape, "Fibron," is manufactured from Vinylite resin. Said to be heat-sealing, flame resistant and high in dielectric and mechanical strength, this tape has many insulation and protective uses. A sample will be sent on request.—*Irvington Varnish & Insulator Co., Irvington, 11, N. J.*

• • •

Safety Goggle

Of 44.6 mm. size and special eyecup shape, a new safety goggle for women workers is fitted with clear flat Super Armorplate lenses. Although light in weight for comfort, this goggle is said to be very durable. Each eyecup is designed individually to fit the orbit of the eye. The goggle, low set for wide angle vision, has an insulated, easily adjusted ball-chain bridge and adjustable headband.—*American Optical Co., Southbridge, Mass.*

Association Elections and Activities

New member of the Wisconsin Society of Professional Engineers include Charles A. Robertson, William B. Tucker and Charles D. Wilson of Allis-Chalmers, Milwaukee, and Robert J. Strass, Worden & Allen, Milwaukee.

Joe Kellum was elected president of Birmingham Chapter, Foremen's Association of America, at recent meeting. Other officers are Barney McCullar, vice president; Albert Schober, treasurer, and Clarence Roberson, secretary.

Arthur A. Knock, Canton, Ohio, contractor, was elected regional vice president and a member of the legislative committee of the Ohio Home Builders Association at its recent meeting in Columbus. Wilburn Kerr, Columbus, was elected president and G. J. Goodreau of Cleveland vice president.

Representative Sid Simpson of Carrollton, Ill., has been elected to a 2-year directorship of the National Rivers and Harbors Congress.

H. F. Schatter of Miami, Fla., was re-elected president of the American Society of Sanitary Engineers at the annual convention of that organization held in St. Louis recently. Other officers are: J. R. Walker, Waterbury, Conn., secretary, and T. M. Dugan, McKeesport, Pa., treasurer.

The Canadian Engineering Standards Association has changed its name to the Canadian Standards Association; its functions will be broadened to include standardization of industrial materials and processes other than those within the field of engineering.

Founded in 1919, the association has been responsible for the preparation and publication of about 180 standard engineering specifications and codes; about 20 more are about to be published. It is affiliated with the National Research Council of Canada and is supported by grants from government and industry.

The Asphalt Institute of America has established headquarters in Billings, Mont., to serve seven northwest states, including Washington, Idaho, Utah, Montana, Wyoming, North Dakota and South Dakota. J. R. Banning heads the new office.

Builders of the West, Inc., opened Pacific Northwest headquarters in Seattle, Wash., Aug. 29, under the direction of Frank C. Jackson, Seattle, according to B. F. Modglin, San Francisco, president of the organization. The Seattle office will direct Builders of the West Activities in Washington, Idaho and Montana. Others offices will be opened in Portland, Ore., Phoenix, Ariz., Salt Lake City, Utah, Denver, Colo., and Los Angeles, Calif.

The Carolina Road Builders Association, a non-profit, non-commercial corporation, incorporated June 14, 1944, to serve those interested in highway development and construction in North and South Carolina is governed by a board of governors consisting of the president, Nello L. Teer, Jr., Durham, N. C.; one vice-president, E. H. Hines, Greenwood, S. C.; and four governors, two from each state, F. D. Cline, Raleigh, N. C.; W. E. Graham, Cleveland, N. C.; John R. Suber, Whitmire, S. C.; and T. R. McMeekin, Cheraw, S. C. The office of the association is located at 613 Commercial Bank Building, Raleigh, N. C.

Hal M. Davis of R. B. Everett & Co., Houston, has been elected director of Region 10, the states of Texas, Aklahoma and part of New Mexico, Associated Equipment Distributors, for 1944.

Raymond Chase, of the City Engineering Department of Jacksonville, Fla., has been elected president of the Jacksonville Post of American Military Engineers.

Other officers named were John F. Reynolds, first vice president; Bernard Close, second vice-president; Leo L. Burnet, secretary, and Miles Thomas, treasurer.

The board of directors for the coming year will be Lieut. Comdr. E. Thouren, USNR., Col. A. B. Jones, district engineer, and James Ingram.

◆

The city of Asheville, N. C., following a special survey, has announced a proposed postwar public works program of $2,500,000. Included are the development of the North Fork watershed at a cost of $1,200,000, with an impounding dam; a new sewage disposal plant; street rehabilitation, and other projects. City Manager Pat. M. Burdette has filed a report of the survey with the regional Federal Works Agency office at Richmond, Va., to be included in recommendations on postwar planning legislation to be presented to Congress.

More

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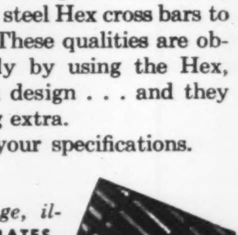
MEAN STRONGER, SAFER STEEL FLOORING FOR YOU

• Now it's easier for you to get **BATES•GRATES**. That means you can have stronger, safer open steel flooring and stair treads in your plant, by utilizing the engineering advantages of **BATES•GRATES**.

Extra strength, safety—*plus* easier maintenance—are due to the low-temperature, pressure-welding of hot rolled steel Hex cross bars to main bars. These qualities are obtainable only by using the Hex, fillet-welded design . . . and they cost nothing extra.

Send us your specifications.

The 16-page, illustrated **BATES** *booklet is a handy guide to plant improvement for all plant managers and engineers. Write for your copy.*



WALTER BATES COMPANY, INC.
JOLIET • ILLINOIS
OPEN STEEL FLOORING • STAIR TREADS

Don't let a "LAZY" oil JUNK your equipment . . .

keep engines on the "GO" with hard-working TALPEX

Equipment is going to the scrap heap fast enough without speeding the trip with a "lazy" oil.

Under normal operating conditions a "lazy" oil might get by. But today, when engines are being worked twice as hard and their operation is twice as important, no operator can afford to take chances with a "lazy" oil . . . one that doesn't have *all* the properties needed to do a complete job of lubrication.

You can't tell whether or not an oil is "lazy" until you give it a job to do. Then it's too late. But of one thing you can be certain; to keep your equipment operating at peak efficiency the oil you trust with the job of lubricating your engines must have *all* of the following properties of new Shell Talpex.

NEW SHELL TALPEX

—**IS NON-CORROSIVE TO ALLOY** bearings. Protects all lubricated engine parts against corrosion.

—**HAS EXCEPTIONAL OXIDATION STABILITY.** Holds to a minimum the formation of sludge, lacquer and other products of deterioration.

—**HAS HIGH DETERGENCY.** Helps keep carbon, lacquer and foreign particles from adhering to pistons and rings, valves, ports.

—**HAS LOW CARBON-FORMING TENDENCY.** Reduces ring sticking and wear. Lengthens engine life.

If the oil you now use doesn't have *all* these properties, it's lazy . . . should be changed to hard-working Shell Talpex. Ask the Shell man to show you why.

SHELL

TALPEX

THE NEW, ALL-PURPOSE, HEAVY-DUTY LUBRICANT

For trucks, busses, tractors, shovels, stationary and marine Diesels

MANUFACTURERS' ACTIVITIES

N. A. HOLMER, formerly director of sales and marketing for the Elastic Stop Nut Corp., of Newark, N. J., is now general sales manager of the Carney Cement Co. and the Carney Rockwool Co., with quarries and plants at Mankato, Minn.

The general sales office of the Carney companies will be in the St. Paul Midway district, at 2478 University Avenue. Mr. Holmer and the Carney sales staff will move to the St. Paul offices from Mankato.

N. A. Holmer was formerly general sales manager of the Mid-State Steel & Wire Co., of Crawfordsville, Ind., distributing farm steel products to a national market of jobbers, lumber dealers, building and hardware supply outlets. Previously he headed sales for Unity Mills Distributing Co., distributing steel products, and building materials in the northwest.

FLOYD R. WILSON, Montclair, N. J., has resigned as vice president and director of Ransome Machinery Co., Dunellen, N. J., a subsidiary of Worthington Pump & Machinery Corp., Harrison, N. J., and has terminated his connection with the company.

A BOOM in the asphalt business after the war was predicted by C. L. Vandenburgh, general manager of the Trinidad Lake Asphalt Co., of Trinidad, in an interview at Niagara Falls, N. Y. He said that Great Britain and the United States work harmoniously in Trinidad, and that American business men receive every courtesy and cooperation from citizens and the government.

JOHN A. LITTLE, 54, comptroller, Welsbach Engineering and Management Corp., died in Philadelphia recently.

Mr. Little joined the Welsbach organization as an office boy in 1906, and, except for nearly two years' service in the army during the First World War, including active service in France, his employment was uninterrupted with Welsbach and its subsidiary companies, such as Kitson Co., Ozone Processes, Inc., and Welsbach Street Lighting Co. Mr. Little was elected

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MICROTOMIC
VAN DYKE
DRAWING PENCILS

...for Sharp, Readable PRINTS

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FOR 25¢ POSTPAID
A VAN DYKE 20" CIRCULAR SLIDE RULE

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Dept. ENR-9, 37 Greenpoint Ave., Brooklyn 22, N. Y
Here is my 25¢ . . . please mail Slide Rule at once, to

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EVEN TIGER BRAND NEEDS IT!
AMERICAN TIGER BRAND WIRE ROPE
AMERICAN STEEL & WIRE COMPANY

Add life to your wire ropes with LUBRICATION

One of the most frequent causes of premature wire rope failure is lack of proper lubrication. Yet lubrication is such a simple means of extending rope life that it seems incredible that rope users should overlook it. But they do.

Every American Tiger Brand Wire Rope comes to you from the factory, properly lubricated and ready for service. But factory lubrication, no matter how efficient, will not last the life of the rope. Field lubrication at regular intervals is absolutely essential. Wire rope is a machine, composed of many working parts. It requires periodic lubrication to reduce frictional wear.

Use a well-tested lubricant like Tiger-Lube which has been developed through years of study and research. Be sure that the rope surface is clean and that the lubricant is applied uniformly and thoroughly.

Lubrication is insurance against corrosion and is the safest way to prevent excessive internal and external rope wear. Lubrication will materially assist in controlling the wear on sheaves and drums and in prolonging rope life, resulting in increased operating efficiency.

AMERICAN STEEL & WIRE COMPANY
Cleveland, Chicago and New York
COLUMBIA STEEL COMPANY
San Francisco
United States Steel Export Company, New York

Excellay Preformed

UNITED STATES STEEL

assistant secretary of the group in 1940, and became comptroller in 1941.

E. E. **Quimby** has been chosen commercial vice president of Economy Pumps, Inc., Hamilton, Ohio, specializing in sales transactions for large projects too involved for a resale agency, such as flood control work, etc. Mr. Quimby is widely known as senior partner of Quimby-Ryan, 1 East 42nd St., New York City. His firm has represented Economy pumps since 1928 and he will continue his active connection with Quimby-Ryan in addition to his new relation with Economy. Mr. Quimby has a background of 25 years in the pump industry. For several years he was sales manager for the Quimby Pump Co. and later was vice president and general manager of the Sundh Electric Co. of Newark, N. J. When that company was sold to the Clark Controller Co. Mr. Quimby joined with E. T. Ryan in forming the Quimby-Ryan Co. His engineering schooling was received at the Drexel Institute, Philadelphia.

Alexis J. Diakoff has been appointed consulting engineer of the diesel engine department of the Schenectady plant of American Locomotive Co.

Mr. Diakoff goes to American Locomotive from the University of North Dakota where he was head of the mechanical engineering department.

Early in his career Mr. Diakoff was chief engineer of the submarine "Burevestnik" of the Russian Black Sea fleet. The fleet was evacuated to North Africa. He was then put in charge of consultation and operation of diesel and gas power plants in Tunisia and Algeria.

Later Mr. Diakoff was connected with the diesel department of the Rennault Works, near Paris. In that capacity he tested installations and was designing engineer of diesel engines. During this period he worked with Professor Arschaouloff on the latter's solid injection system. Mr. Diakoff also made a special study of internal combustion engines at Ecole Arts et Metiers in Paris.

In 1923 Mr. Diakoff came to the United States to be associated with the Ford Motor Co. and later the Detroit Edison Co. as a designing engineer.

HIGH
...AND DRY

Photos courtesy Pan American Airways.

In Yucatan . . . for Pan American Airways; in any spot . . . for you, a Novo Diaphragm Pump does the job. Novo Diaphragms help keep your Profit HIGH and your Job DRY!

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ENGINE COMPANY LANSING, MICHIGAN

Also a member of A.E.D.

NOVO ENGINE CO., 200 Porter St., Lansing, Mich.
Please send me bulletin No. 167-C with full information about Novo Diaphragm Pumps.

Name________________________________

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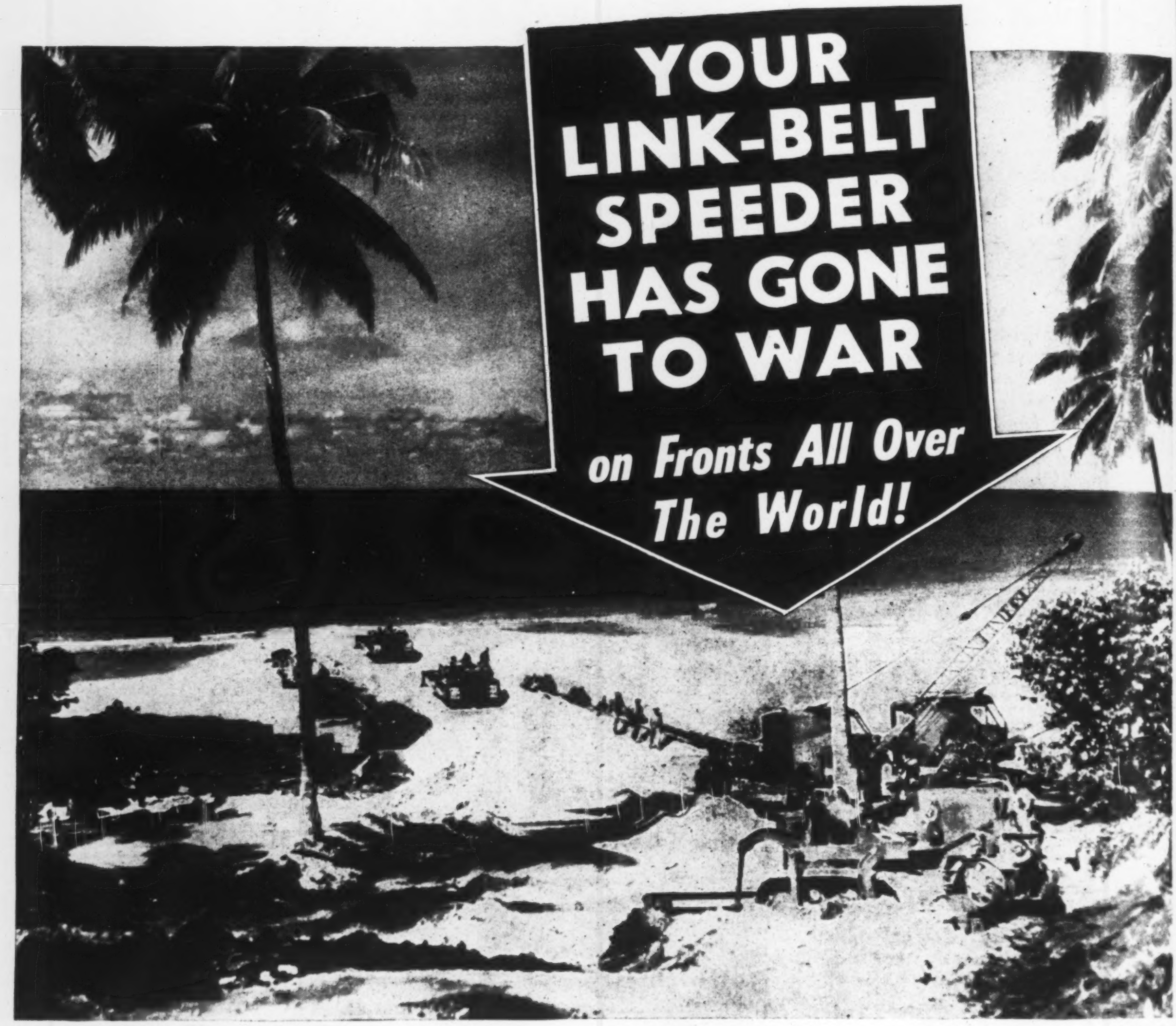


YOUR LINK-BELT SPEEDER HAS GONE TO WAR

on Fronts All Over The World!

● These easy-to-handle, rugged machines can be found on battle fronts all over the globe. Construction battalions everywhere are using them to build landing strips, lay road beds and perform the dozens of other tasks that must be done in order to secure captured territories for further attack on the enemy!

9592

LINK-BELT SPEEDER

Builders of the Most Complete Line of

SHOVELS–CRANES–DRAGLINES

LINK-BELT SPEEDER CORPORATION, 301 W. PERSHING ROAD, CHICAGO-9, ILL.
(A DIVISION OF LINK-BELT COMPANY)

★ pipe insulation

For assured lasting efficiency!
2
PF (Pre-formed)
PIPE INSULATION

.. another job for

FIBERGLAS*

IF IT'S TOO HOT TO TOUCH
IT NEEDS INSULATION

In cooperation with the Government program to save critical fuel.

. . . and if it's pipes that need covering — or re-covering — Fiberglas PF Pipe Insulation is the answer. It provides a highly efficient and convenient method of insulating steam and other hot lines of all sizes up to 30″ O.D. for temperatures up to 600° F.

Fiberglas PF Pipe Insulation is exceptionally lightweight, consisting of fine glass fibers bonded with a thermosetting binder and molded into hemi-cylinders and segments.

The unusually low thermal conductivity of Fiberglas PF Pipe Insulation produces significant direct savings of heat and power. And the unique characteristics of this material bring installation and maintenance economies that have also helped to win industry-wide approval and acceptance.

Because of its mechanical strength, this pipe covering holds its shape, withstands handling and is easily applied, even on the largest pipes—where only three segments are required. The material is easily cut with a knife and the fibrous ends of sections interlace to form tight joints.

Fiberglas does not rot or decay, disintegrate or pack down under vibration.

For more information on Fiberglas Pipe Insulation or the many other uses of Fiberglas, write for booklet, "Fiberglas Insulations for Industry", *Owens-Corning Fiberglas Corp., 1840 Nicholas Bldg., Toledo 1, Ohio. In Canada, Fiberglas Canada, Ltd., Oshawa, Ontario.*

OTHER FIBERGLAS INSULATIONS

1. ***No. 60 PF Block***—Same materials as in PF Pipe Covering—in blocks 6″ x 36″ and 12″ x 36″, standard thicknesses.

2. ***OC-1800 High Temperature Block***—A highly efficient and rugged molded block in sizes 6″ x 36″ and 12″ x 36″—in standard thicknesses. Will withstand surface temperatures up to 1800° F.

3. ***Metal Mesh Blankets***—With mesh wire or expanded metal on one or both sides. Light weight, and easily applied, 2 ft. x 4 ft. and 2 ft. x 8 ft. In standard thicknesses. Two types: For temperatures up to 600° F. and 1000° F.

4. ***Blanket Type Pipe Insulation***—With mesh wire on outer side to wrap around pipe and secure with wire through special edging. Manufactured in 2-ft. sections for pipes over 3″ O.D. Will withstand temperatures up to 1000° F.

5. ***Insulating Cement***—For insulating fittings, valves and all irregular surfaces. Highly efficient . . . withstands temperatures up to 1200° Fahrenheit.

6. ***OC Mastic***—An asphalt emulsion cement for insulated pipe and equipment exposed to outdoor or high moisture conditions.

7. ***TW - F Wool***—Fabricated in bats, rolls and bulk. Used for drying-ovens, heaters, etc., for filling irregular spaces and for fireproofing.

8. ***PF Board***—Manufactured in 5 densities from 2½ to 9 lbs. per cu. ft.—standard sizes 24″ x 48″, 1″ to 4″ in thickness. For insulated panels, sound absorption and various structural applications.

9. ***PF Roof Deck Insulation***—9 lb. density with facing to facilitate mopping. Highly efficient, fireproof, rotproof and moisture-resistant board, for application under industrial built-up roofings. Sizes 24″ x 48″. Thicknesses from 3/16″ to 2″.

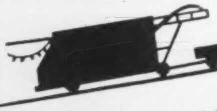
To help you make the proper selection, a "Fuel Savings Calculator" is available for determining heat loss, fuel savings and other factors. Write us for one.

ARMY E NAVY

FIBERGLAS

*Trade Mark Reg. U. S. Pat. Off.

INDUSTRIAL INSULATIONS



Streamline
Your Mixing Operation
with a JOHNSON
PORTO-BATCHER

Saves Time, Handling Equipment, and Truck Mixer Miles

• Eliminates the expense and time waste of long hauls. Easily towed to the most advantageous point in the pouring area, and quickly set up for fast, efficient operation. Meets all state highway requirements as to weight and over-all dimensions. Levers grouped in one central location making it practical for one man to control all batching operations.

Johnson patented charging skip provides pre-mixing and pre-shrinkage which compares favorably with the best results obtainable in modern permanent batching plants. This charging skip has a capacity of 33 cubic feet for aggregate and 10 cubic feet for cement. Batching cycle is 90 seconds. Gumming and excessive wear is eliminated because of effective intermingling of aggregate and cement by Johnson charger skip before the batch comes in contact with wet mixer opening and walls. Write for full details.

READY MIX PLANT
BULK CEMENT HANDLING EQUIPMENT
CEMENT STORAGE BINS
CONCRETE BUCKETS
BATCHERS

the C. S. JOHNSON COMPANY
CHAMPAIGN • ILLINOIS

The Asphalt Institute has announced that the Pacific Coast Division has appointed W. A. Bugge district engineer for the territory comprising northern California, Oregon, and western Washington, with offices at 301 Wilcox Building, Portland, Ore., and 1304 Fourth Ave., Seattle Wash.

Mr. Bugge's engineering experience, starting with the Washington State Department of Highways, covers twenty-two years, including long service as county road engineer of Jefferson County and during the past four years as city engineer of Port Townsend. He is a past president of the Washington State Association of County Engineers.

Frank C. Angle, manager of sales activities in the Pacific region, has been appointed manager of all Allis-Chalmers field sales offices of the general machinery division and their operations, according to an announcement by W. C. Johnson, vice president. He will continue to supervise operations of the Pacific region.

Mr. Angle was appointed manager of the Pacific region in 1943 and placed in charge of all Allis-Chalmers sales and engineering facilities serving industries in the Pacific Coast area. Prior to that he had been manager of the Allis-Chalmers San Francisco district office for seven years.

B. F. Lease, sales manager of Athey Truss Wheel Co., Chicago, has been elected vice-president in charge of sales, advertising and service. Mr. Lease started with Athey in 1931 as special representative, with rapid advancements to district representative; manager, service and research; manager domestic sales and now vice-president. Mr. Lease has had many years experience in field and distributor contacts in the heavy equipment industry, having served from 1917 to 1931 in various capacities with the Republic Truck Co. and Lynn Manufacturing Co.

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Like money in the bank—having thi
completely detailed and illustrated
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Concrete Vibrators

Get the facts and you'll switch from ordinary concrete vibration to high speed, money-saving VIBER-ation.

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34 YEARS
INSTALLING
PILES
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COMPOSITE
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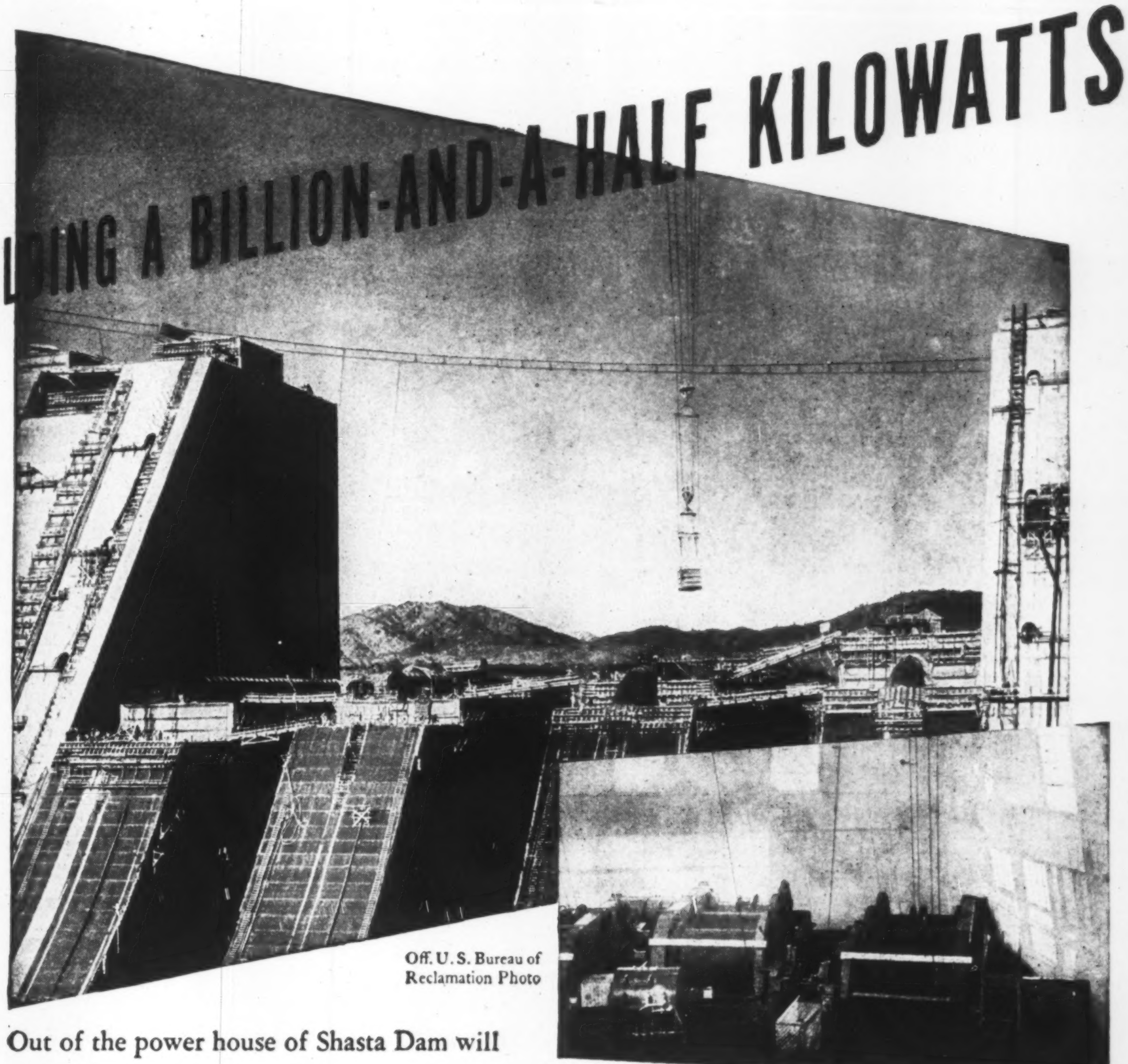
MacARTHUR CONCRETE PILE CORP.
18 EAST 48th STREET, N. Y. C.
Boston • Cincinnati • New Orleans

BUILDING A BILLION-AND-A-HALF KILOWATTS



Off. U. S. Bureau of Reclamation Photo

Lidgerwood hoists employed at Shasta

Out of the power house of Shasta Dam will pour 20 to 25 percent of northern California's total power—over a billion and a half kilowatt-hours annually. That takes quite a dam—and over 6,000,000 cubic yards of concrete to build!

It takes some engineering ingenuity, as well, when a structure of that size is to be built at the bottom of a canyon several hundred feet deep. *That* problem was solved by the use of high speed Lidgerwood cableways, seven of them. The traveling cableways, radiating from one head tower, covered the entire working area without requiring the construction of trackways or roads — moving the vast amount of materials in special 8 cubic yard bottom dump buckets, which discharged by remote control. As in the construction of Boulder, Parker, Bonneville and other great dams, Lidgerwood cableways proved an exceptionally fast and efficient method.

ARMY E NAVY

The First Name in Cableways

LIDGERWOOD
ESTABLISHED 1873
Manufacturing Company
MAIN OFFICE AND WORKS • ELIZABETH B, NEW JERSEY

BLASTED!

... BUT COMMERCIAL TUNNEL LINER PLATE REMAINS UNDAMAGED!

Here COMMERCIAL Liner Plates, serving as temporary roof supports in a rock tunnel, withstand the terrific impact created by blasting in confined space without damage or danger. Note that the only damage was a small dent in one of the liner plates (circle). This visible proof of COMMERCIAL Liner Plates safe, dependable service under the most adverse conditions is your assurance of their utility. Write today for COMMERCIAL'S booklet on tunnel construction and methods. It contains many such examples of the effectiveness of COMMERCIAL Liner Plates.

THE COMMERCIAL SHEARING & STAMPING CO.
YOUNGSTOWN 1, OHIO

DRILLING CONTRACTORS

DIAMOND AND SHOT CORE BORINGS—DRY SAMPLE BORINGS

Foundation Testing for Bridges, Dams and All Heavy Structures

Also

Manufacturers of Diamond and Shot Core Drills, Accessories and Equipment

SPRAGUE & HENWOOD, Inc.
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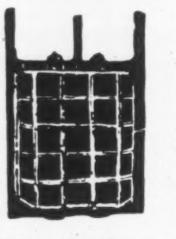
SLUICE GATES



Also flap and mud valves, shear and filler gates. Dependable equipment since 1840.

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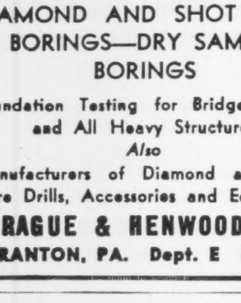
79 Lake St., Orange, Mass., U.S.A.



3-AXLE MOBILE CRANE for Heavy Duty LIFTING

● Powerful Unit 1020 mounted on a husky 3 axle under carriage supplies maximum lifting ability. Features include: Hydraulic Steering • Air Brakes • Disc Clutches • Enclosed Cast Gear Case ... Easy one man operation.

UNIVERSAL UNIT MACHINERY CORP. Milwaukee 14 Wis.

NEW
TRADE PUBLICATIONS

The Choice of Buckets—The problem of selecting the proper bucket to meet the operating requirements when single drum hoists and hook-on applications are involved is simplified by a new 48-page catalog. It amply classifies the different types and their uses, as follows: How to select; typical method of installation; table of sizes; and typical illustrations.—*Blaw-Knox Division of Blaw-Knox Co., P. O. Box No. 1198, Pittsburgh, Pa.*

Cement Plant Bulletins—Two new bulletins describing portable cement plants have been issued. Written concisely, they summarize operating features, and the uses of each type of plant, together with general specifications.

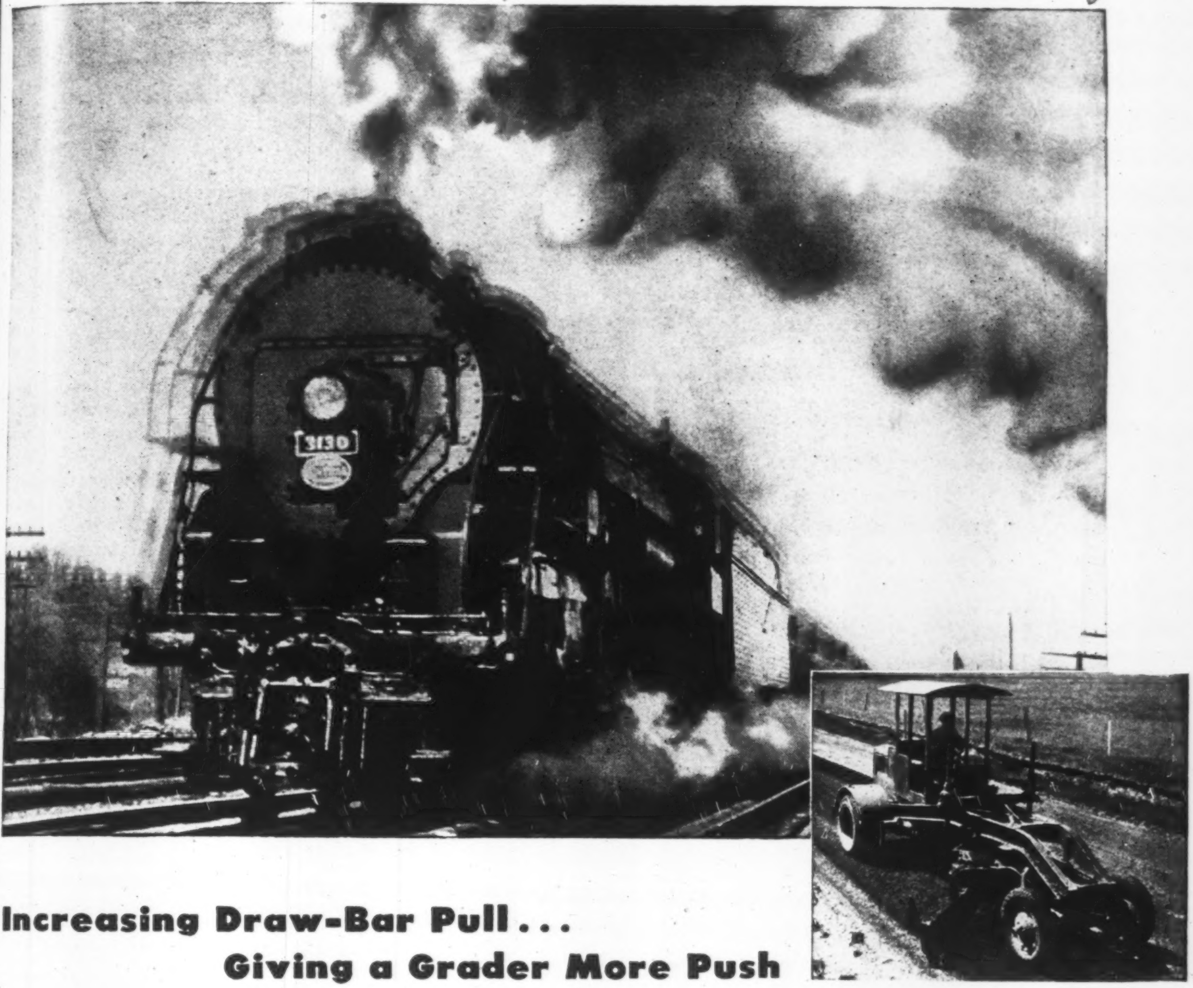
Copies of these are available on request to contractors, dealers, and ready mixed concrete producers.—*C. S. Johnson Co., Champaign, Ill.*

Self-locking Nuts—A new catalog and data book on self-locking nuts, practically an engineering handbook, is available to users of fastenings. The book covers the hex, anchor, and clinch types of nuts, and contains a wealth of material that every design engineer will appreciate, because it puts in easy-to-find form all of the data necessary for the intelligent planning of vibration-proof connections.—*Elastic Stop Nut Corp. of America, Union, N. J.*

Centralized Lubrication—How centralized lubrication systems increase the output of machinery and make savings in time, power and lubricating materials, is the theme of this 16-page bulletin. Printed in three colors, it is a graphic portrayal of the theory and practice of mechanical lubrication.—*The Farval Corp., Cleveland, Ohio.*

Steel Grating and Stair Treads—Illustrated with photographs of the products in actual use, this booklet adds to detailed construction particulars, drawings and tabular specifications, providing full installation data. Subjects covered are the uses of riveted and welded types of grating for open steel floorings, stairways, stair treads, fire escapes, loading platforms, decks for bridges and ships, automobile wash

Making strong the things that make America strong



Increasing Draw-Bar Pull . . . Giving a Grader More Push

A WAR-WORKING locomotive . . . hauling heavier loads at faster speeds . . . begrudging every minute required for repairs . . . needs bolts and nuts so strong they defy the shock and stress of pulls and bumps and banging vibration.

A grader . . . with no tracks to ride . . . takes even a greater beating. Its fasteners need true threads of tough metal so they'll neither relax their grip nor fail under tension.

Whether strength or accuracy is the chief requirement of your product's fasteners, you get both when you use RB&W EMPIRE products. For, the same manufacturing steps that make them strong build accuracy into their dimensions.

For 99 years, constantly improved strength, accuracy and finish of RB&W products have resulted from continuous research and progress. Starting with RB&W's development of the first automatic cold-header, this progress has been sustained by great investments in the most modern manufacturing equipment and most up-to-the-minute methods for quality control from raw material to finished fasteners in the three RB&W factories.

For proof of this maximum combination of strength, accuracy and finish you need only look at the famous names in farm implements, automobiles, railroads, aircraft, power and transmission equipment, construction and general industry that have standardized on RB&W fasteners.

RB&W

Russell, Burdsall & Ward Bolt and Nut Company. *Factories at:* Port Chester, N. Y., Coraopolis, Pa., Rock Falls, Ill. *Sales offices at:* Philadelphia, Detroit, Chicago, Chattanooga, Los Angeles, Portland, Seattle.

BOLTS EMPIRE NUTS-RIVETS

AND ALLIED FASTENING PRODUCTS · SINCE 1845

RUSSELL, BURDSALL & WARD BOLT AND NUT COMPANY

TROJAN

UTILITY PATROL

Saves Time and Money

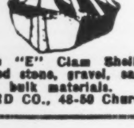
You'll choose the TROJAN if you investigate the work done by the 40 brake h. p. and 10,000 lbs. weight in this modern design patrol. Compare its results with heavier, slower and more expensive equipment.

CONTRACTORS MACHINERY COMPANY, INC.
Dept. NR-94 BATAVIA, N. Y.
Represented by The International Harvester Industrial Dealer in Your Community

One of 5 TROJANS recently delivered to the State of Virginia Highway Department.

TROJAN ROAD TOOLS INCLUDE: PATROLS, SELF-POWERED SPEED TAMPERS, DRAWN TAMPING ROLLERS, SCRAPERS

Hayward Buckets



Use this Class "E" Clam Shell Bucket for handling crushed stone, gravel, sand and other bulk materials.
THE HAYWARD CO., 48-50 Church St., N. Y.

STERLING LIGHT PLANTS

THE CHOICE OF LEADING CONTRACTORS

SIMPLE—DEPENDABLE—RUGGED
WRITE FOR LITERATURE

STERLING MACHINERY CORPORATION
405 Southwest Blvd., Kansas City

racks, drains, catwalks, tower stairs, boiler and engine rooms, sidewalks, partitions—in all nearly fifty distinct services.—*Wm. F. Klemp Co. [illegible]1 So. Melvina Ave., Chicago 38, Ill.*

Lumbermen's Directory—A membership directory for the West Coast Lumbermen's Association, revised to June 1, 1944, has just been issued. It lists the various sawmills, loggers, wood-pipe manufacturers, wood-treating and timber-fabricating companies, showing location of plants, principal equipment, species and items produced by each.—*West Coast Lumbermen's Association, 364 Stuart Building, Seattle, Wash.*

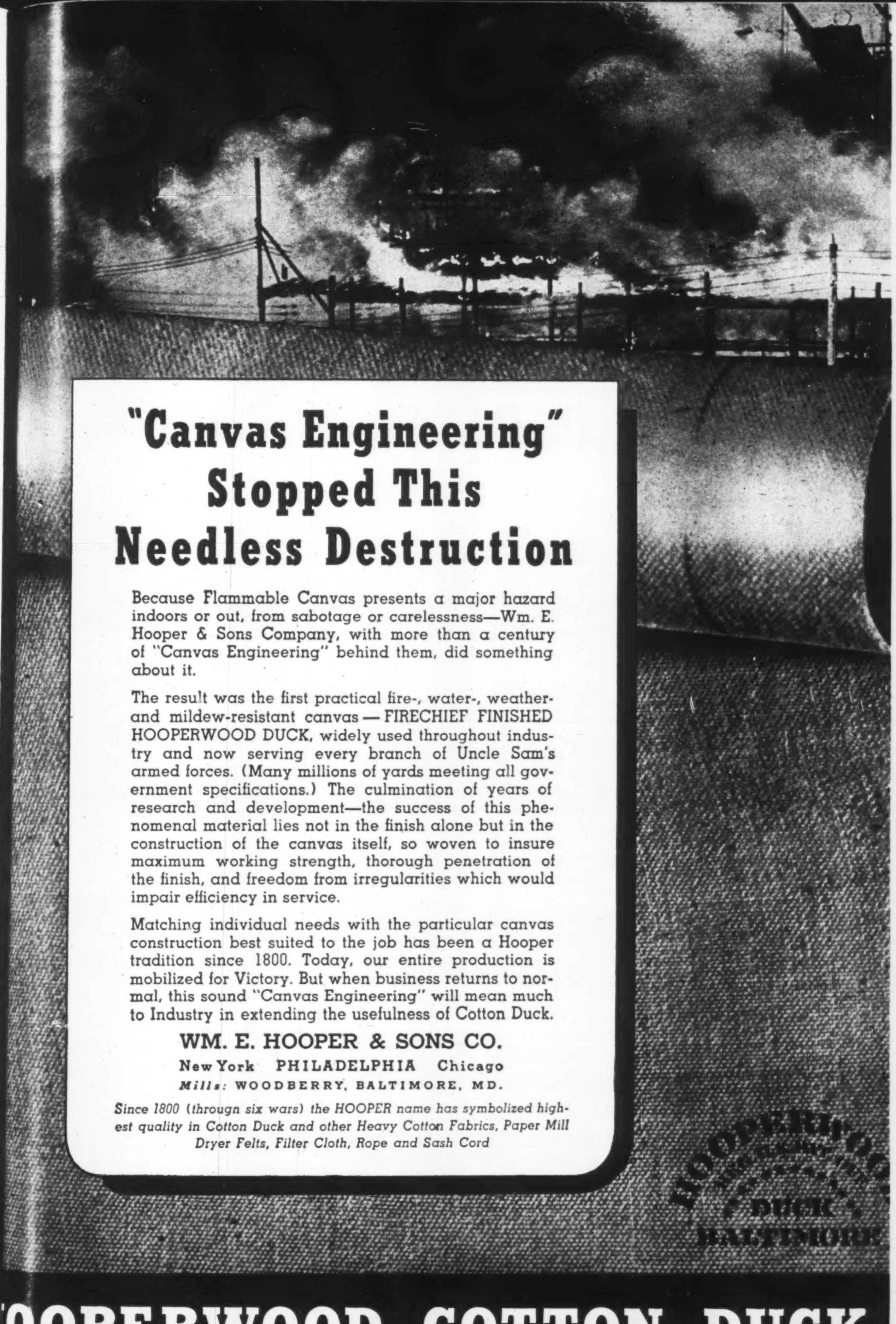
High Speed Sawing Machine—A new high speed friction cutting machine is now described and illustrated in a 4 page bulletin.

This bulletin gives specifications and the high operating speeds of these new machines showing their wide application in the shaping and fabricating of such materials as light alloys, plastics, wood, rubber and sheet metal.—*Continental Machines, Inc., 1301 Washington Ave., South, Minneapolis 4, Minn.*

Wire Rope Shears—The third edition of a bulletin describing improved features of hydraulic and hand shears for cutting commercial grade wire rope, flat bars, round bars and varying shapes and metals has just been published. The shears described and illustrated are of two types, hand and hydraulic. The hand shear is stated to produce clean, fast cutting with power and ease. The weight of the shear body is distributed so as to get the perfect balance needed for giving maximum cutting strength with minimum manual effort.

The hydraulic shear is made for service requiring greater strength and capacity than can be obtained from a hand shear. It is rugged, powerful and cuts with speed and accuracy. It is supplied for bench mounting but may be had for mounting on a small portable truck.—*Watson-Stillman Co., Roselle, N. J.*

Turbine Flow Rate Measurement—Operation of W-K principle in combination with Simplex MO Meter is clearly described and illustrated in a booklet. The MO meter accurately indicates, records and totalizes flow rate measurement of differential taps in water turbines. Taps are placed on turbine installations already operating, as well as within new constructions. Design and engineering service is offered by the company—*Simplex Valve & Meter Co., 6800 Upland St., Philadelphia 42, Pa.*



"Canvas Engineering" Stopped This Needless Destruction

Because Flammable Canvas presents a major hazard indoors or out, from sabotage or carelessness—Wm. E. Hooper & Sons Company, with more than a century of "Canvas Engineering" behind them, did something about it.

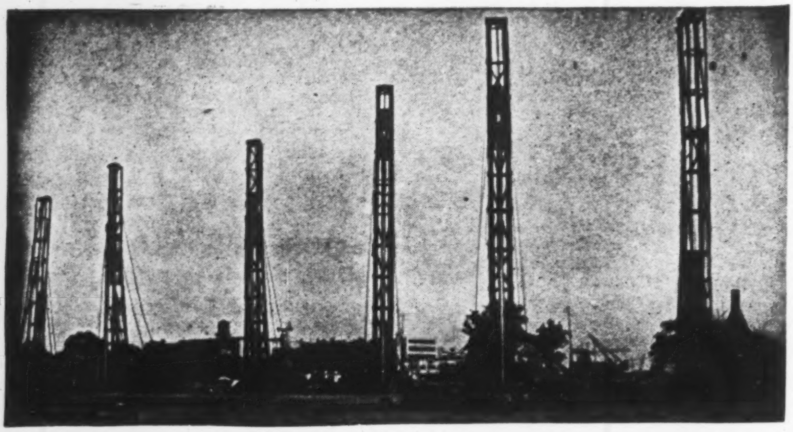
The result was the first practical fire-, water-, weather- and mildew-resistant canvas — FIRECHIEF FINISHED HOOPERWOOD DUCK, widely used throughout industry and now serving every branch of Uncle Sam's armed forces. (Many millions of yards meeting all government specifications.) The culmination of years of research and development—the success of this phenomenal material lies not in the finish alone but in the construction of the canvas itself, so woven to insure maximum working strength, thorough penetration of the finish, and freedom from irregularities which would impair efficiency in service.

Matching individual needs with the particular canvas construction best suited to the job has been a Hooper tradition since 1800. Today, our entire production is mobilized for Victory. But when business returns to normal, this sound "Canvas Engineering" will mean much to Industry in extending the usefulness of Cotton Duck.

WM. E. HOOPER & SONS CO.
New York PHILADELPHIA Chicago
Mills: WOODBERRY, BALTIMORE, MD.

Since 1800 (througn six wars) the HOOPER name has symbolized highest quality in Cotton Duck and other Heavy Cotton Fabrics, Paper Mill Dryer Felts, Filter Cloth, Rope and Sash Cord

OOPERWOOD COTTON DUCK



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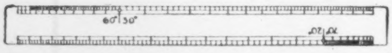

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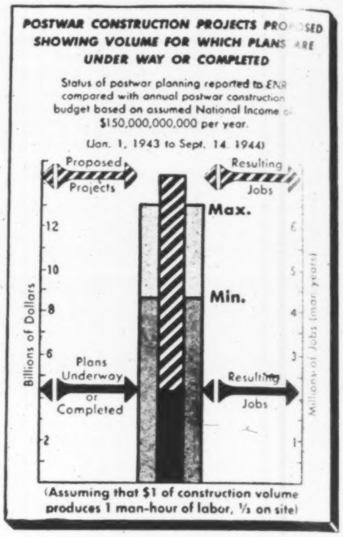
POSTWAR PROJECTS



Projects proposed for postwar construction have been published in these columns since January, 1943 as they have been reported to ENGINEERING NEWS RECORD.

Statistics based on these reports are used by the Committee on Postwar Construction of the American Society of Civil Engineers to measure the progress of plans for postwar projects.

The chart above shows, both in estimated dollar volume and in jobs or man-years of labor, how fast this reservoir of future work is filling up.

WATER SUPPLY

PROPOSED WORK

Ark., Little Rock—North Little Rock Water Co., 117 E. 3 St., exten. watermains in Clover area. Over **$15,000.**

Calif., Arcata—City, water sys. development, **$262,430.**

Calif., Davis—City, water sys. exten. **$25,000.**

Calif., Eureka—City, completion municipal water sys. with treatment plant and storage water reservoir. **$265,000.**

Calif., Fortuna—City, water sys. exten. Not to exceed **$30,000.**

Calif., Fresno — City, water distribution. **$200,000.**

Calif., Pittsburg—City, filter plant. **$18,000.**
Calif., Yreka—City, imprv. water sys. **$28,000.**

Ind., Michigan City — Bd. Waterworks Trustees, C. Sweeney, pres., 532 Franklin St., imprv. WW, new pumps, elevated water tower, pump. station addn. **$141,000.** H. Draves, supt. WW.

★**Mich., Detroit**—Dpt. Water Supply, 735 Randolph St., 54, 48 and 36 in. watermain exten., in 8 Mile Road-Telegraph to Livernois to Bennett, **$1,910,000;** 54 in. watermain exten. in W. Chicago, **$1,080,000;** 48 and 36 in. main exten. in Evergreen Rd., **$1,395,000.** L. G. Lenhardt, 735 Randolph St., supt. genl. mgr.

Mo., Boonville—City, electricfying water plant, **$15,000.**

R. I., East Providence—Town Water Dpt., relaying about 5,280 lin. ft. 16 in. watermain, installing new 250 h.p. generator in pump station. Over **$25,000.** Financing not yet provided for.

Tex., Kilgore—City, WW sys. imprvs. **$50,000.**

Ont., Goderich—Public Utilities Comm., S. H. Blake, town clk., overhauling entire water sys., relaying many existing mains with large pipe. About **$100,000.**

PLANS UNDERWAY

Ind., Alexandria—City Council, H. E. DeMoss, City Hall, WW imprvs., deep well, electric deep well pump, expan. WW sys. Jno. W. Moore & Son, 720 Indiana Pythian Bldg., Indianapolis, consult. engr.

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Good Water and Bad Mosquitoes
Battle of Engineer Hill
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POSTWAR PROJECTS (Cont'd.)

Ind., Tell City—City Council, W. Werner, mayor and chn., and Nicholas Beumel, clk., 400,000 gal. water storage tank and new distr. sys. pumps. M. L. Burden, Cannelton, consult. engr.

Kan., Larned—City, F. L. Frizell, mayor, water softening plant. **$175,000.** Black & Veatch, 1706 Bway., Kansas City, Mo., consult. engrs. CD 11/5—ENR 11/11.

Kan., Phillipsburg—City, J. Groom, mayor, WW imprvs. **$125,000.** Wilson & Co., P. O. Box 815, Salina, consult. engrs.

Kan., Pittsburg—City, W. O. Myers, mayor, City Hall, WW imprvs. **$50,000.** Black & Veatch, 1706 Bway., Kansas City, Mo., consult engrs.

Kan., Russell—City, H. D. O'Brien, mayor, WW imprvs. **$20,000.** Wilson & Co., Public Utility Bldg., Salina, consult. engrs.

★ **Mich., Detroit**—Wayne Co. Road Comn., 3800 Barlum Tower, 11 mi. 24 in. watermain in Eureka Rd. from Fort Road west serving Romulus and Taylor Twps., etc. $1,200,000; 12 mi. 24 in. watermain in Schoolcraft Rd. serving Redford and Livonia Twps., and serving as Schoolcraft Rd. feeders making supply available to Plymouth and Northville, Wayne Co. Training School, Detroit House of Correction and Maybury Sanitarium. **$1,200,000.** L. G. Smith, engr.

Neb., Fairbury—City, WW reservoir, **$75,000.** C. E. Bell, Fairbury, supt. and engr.

Tenn., Murfreesboro—City, c/o S. Cox, mgr., plans 35% completed constructing waterline from Walter Hill Dam to city, and imprv. WW. **$280,000.** Roberts & Co., Third National Bank Bldg., Nashville, consult. engrs.

★ **†Tex., Fort Worth**—S. H. Bothwell, city mgr., City Hall, 5 year expansion plan for WW Dpt., for 1944-1945 engineering report and study **$14,000,** Lake Worth Inlet enlargement **$40,000,** new motor equip. **$12,000,** Holly Plant outlet enlargement **$40,000,** new c.i. mains and exten. **$100,000,** one 15 m.g.d. pump and motor **$45,000,** painting steel tanks **$10,000,** cleaning main (dual) **$10,000,** purchasing private sys. **$200,000,** for 1945-1946 leakage survey **$10,000,** elevated steel storage **$150,000,** enlargement 3 booster stations **$125,000,** new North Side Booster Station **$75,000,** new motor equip. **$20,000,** remodeling Holly Plant **$90,000,** new 4 m.g.d. clear well **$200,000,** new c.i. mains **$200,000,** for 1946-1947 new 20 m.g.d. filter **$180,000,** new motor equip. **$15,000,** new sedimentation basin **$150,000,** new c.i. mains **$300,000,** new equipment booster stations **$18,000,** new meter shop **$25,000,** for 1947-1948 new warehouse **$50,000,** new motor equip. **$20,000,** chemical house and mixing basin enlargement **$125,000,** Holly Plant drives and ground imprv. **$35,000,** garage **$45,000,** c.i. mains **$100,000,** new equipment booster stations **$15,000,** for 1948-1949 new 15 m.g.d. pumps and motors (2) **$90,000,** new c.i. mains **$100,000,** new motor equip. **$10,000,** new conduit from Lake (2 years) **$700,000,** for 1949-1950 new conduit from Lake **$800,000.** Freese & Nichols, 407 Capps Bldg., consult. engrs. CD 5/5—ENR 5/18.

Tex., San Antonio—City, c/o Water Bd., 106 W. Market St., plans 10% completed imprv. Market St. water supply station, **$25,000;** new water supply well, Ave. B and 8 St., **$30,000;** plans 5% completed laying 4- to 6-in. c.i. feeder lines from Ave. B and 8 St. water supply well, **$45,000.**

Tex., San Antonio—City, c/o Water Bd., 106 W. Market St., installing 10 in. c.i. feeder lines supplying elevated steel tank, off Highland Park, southeast section, **$40,000;** 4- to 6-in. feeder lines radiating from new supply well in northwest Woodlawn section, **$25,000;** developing new water supply (artesian well) off Harlandale in southwest, **$25,000;** laying new feeder lines from artesian supply well off Harlandale, southwest section, **$25,000;** developing artesian water supply well, northwest Woodlawn section, **$25,000.** Engineer c/o Engineering Staff of Bd.

Man., St. Boniface—Municipality, replacing 8 mi. 4 in. watermains and reconnecting dead ends **$105,978;** constructing watermains in Archibald St. from Swift plant to Elizabeth Rd., **$15,000;** elevated water tank, **$75,000.** J. A. Bibeau, City Hall, supt. and engr. CD 1/24—ENR 2/10.

Ont., Alexandria—Municipality, water sys. extens., imprvs. **$50,000.** Pub. Utilities Comn., c/o P. A. Charlohois, Alexandria, engr.

Ont., Parry Sound—Municipality, c/o H. Polkinghorne, secy., installing duplicate supply main from pump. station to business section of town. **$50,000.** Pub. Utilities Comn., Parry Sound, engr.

Ont., Peterborough—Municipality, filtration plant exten., new pump. equip., imprv. watermain distr. sys. **$100,000.** Utilities Comn., R. L. Dobbin, mgr., 233 Aylmer St., engr.

Ont., Simcoe—Municipality, installing new unit in pump. station, water softening plant exten. **$50,000.** Pub. Utilities Comn., Simcoe, engr.

Ont., Stratford—Municipality, add[illegible] pump. equip., renewals at pump. station, [illegible] on distr. sys. **$30,000.** Pub. Utility [illegible] A. B. Manson, engr.

★ **Ont., Timmins**—Municipality, A. [illegible] Shaw, clk., 43,025 ft. watermain exten., $184,761; water treatment plant, **$250,000;** 4,0[illegible] water meters, **$80,000.** J. D. MacLean, Town Hall, engr.

Que., Hull—City, R. Brunet, mayor, exten. WW sys. $71,300. T. Lan[illegible] c/o owner, engr. CD 2/10/43—ENR 2/[illegible]/43.

★ **Que., Montreal**—Municipality, c/o J. A. Mongean, city clk., purchasing, closing off 2 lakes on Laurentian Mountains thus forming reservoir for city's water supply and laying pipeline from there to city. $25,000,000. Montreal Water Bd., St. Joseph St., Verdun, engrs.

Que., Quebec City—Municipality, filter plant and artesian wells, regulators at Limoilou pump. station, **$150,000.** E. Hamel, City Hall, city engr.

Sask., Saskatoon — Municipality, clear water reservoir, **$200,000,** extending mains, **$100,000.** G. D. Archibald, City Hall, city engr. CD 1/17—ENR 1/27.

PROJECTS CANCELLED

★ **Mich., Detroit**—Dpt. Water Supply, 735 Randolph St., cancelled following projects: 54-48 in. watermain, West Chicago-Evergreen, **$2,730,000;** 54 in. watermain, Eight Mile Rd., Livernois to Meyers Rds., **$300,000;** 48 in. watermain Eight Mile Rd., Meyers to Greenfield Rds., **$350,000;** 36 in. watermain, Eight Mile Rd., Greenfield Rd. to Telegraph to Bennett, **$963,000;** 24 in. watermain Fourth St. Fort to Cherry St., **$75,000;** 16 in. watermain Eight Mile Rd., **$31,000.** CD 7/12—ENR 7/27.

SEWERS, WASTE-DISPOSAL

PROPOSED WORK

Calif., Arcata—City, sewage disposal sys. **$100,000.**

Calif. Davis—City, sewerage plant, **$100,000;** storm drainage facilities, **$10,000.**

★ **Calif., Fresno** — City, sewage disposal, sewers, **$980,000;** storm water control, **$191,000.**

Calif., Redding—City, sewage disposal sys. **$150,000.**

Kan., Atchison—D. Van Ness, city mgr., City Hall, sewers. **$48,177.**

★ **Mich., Detroit**—Wayne Co. Drain Comn., 3505 Barlum Tower, Ecorse Drain 2, Allen Rd. to Inkster Rd. Sanitary Trunk Sewer; sanitary interceptor, trunk sewer serving south portion Dearborn and Nankin Twps., part of Allen Park village and northeast part Romulus Twp., incl. Wayne Co. Airport, **$1,525,000.** Geo. A. Dingman, drain comr.

Mich., Eloise—Wayne Co. Infirmary, Eloise, 1 story incinerator plant with drainage, **$30,000;** sewer, watermain and power service extens., **$250,000.**

Tex., Kilgore—City, sewers. **$75,000.**

Wash., Monroe—City, City Hall, sewage disposal plant. **$25,000.**

Ont., Hamilton — Municipality, sewer in Wentworth St. from Fennel to Queensdale Aves. **$154,000.**

Ont., Port Hope — Municipality, sewage treatment plant. **$40,000.**

Ont., Rainy River—Municipality, sewage treatment plant. **$40,000.**

Ont., Wallaceburg — Municipality, sewage treatment plant. **$50,000.**

Ont., Windsor—Municipality, sewage treatment plant. **$50,000.**

PLANS UNDERWAY

★ **Ill., Decatur** — City, City and County Bldg., plans 50% completed Edward St. relief sewers, **$135,000;** plans 25% completed Terrace Garden relief sewers, **$22,000;** preliminary plans underway Northwest relief sewers, **$35,000;** plans Northeast relief sewers, **$750,000;** preliminary sketches Prairie St. Dist. relief sewers, **$200,000;** Prairie St. sewer rehabilitation **$65,000;** plans 7th Ward sewer rehabilitation, **$60,000.** Warren & Van Praag, Standard Office Bldg., consult. engrs. CD 10/18—ENR 10/21.

★ **Ill., Mt. Vernon**—City, City Hall, plans completed storm and sanitary sewerage sys., new plant either at present plant location or ½ mi. further east. **$650,000.** Financing not yet provided for. Hurst-Rosche, Hillsboro, engrs.

Ill., Murphysboro—City, preliminary plans underway sewage disposal plant on Big Muddy River, **$200,000.** E. A. Fulton, [illegible] Mermac St., St. Louis, Mo., consult. engr.

Kan., Eldorado—City, H. E. McMillen, mgr., sanitary sewer. **$67,000.** R. A. Shook, city engr.

Mass., Greenfield—Town, E. L. Bond, supt. Dpt. Streets & Engineering, Town Hall, plans completed sewage and drainage exten. $73,881. Financing not yet provided for.

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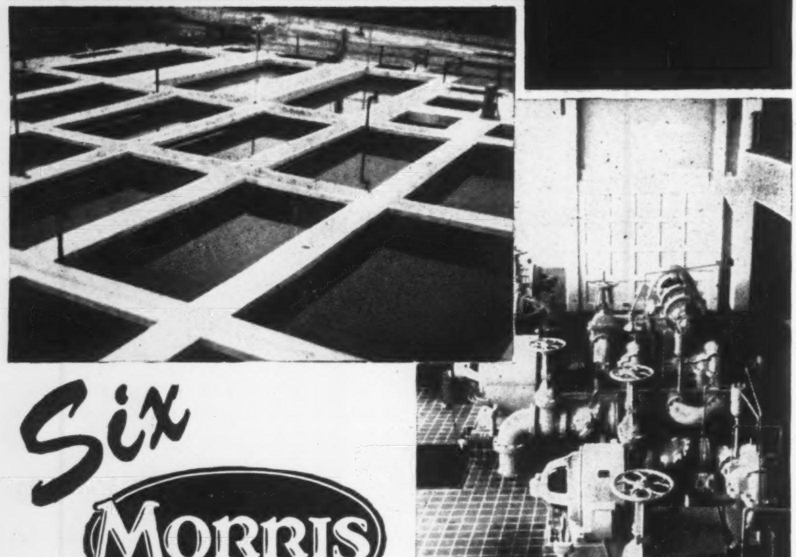

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POSTWAR PROJECTS (Cont'd.)

★ **Mich., Detroit**—City Dpt. P. Wks., City Hall, preliminary plans underway Lonyo Relief Sewer, new outlet into Detroit River or Rouge River and exten. into [illegible] sections new existing Lonyo area between Lonyo and Hubbell areas, **$9,600,000.** Geo. R. Thompson, City Hall, city engr.

★ **Mich., Detroit—Dpt. P. Wks.,** City Hall, plans underway Northwest District Storm Relief Sewers, incl. Part I, Southfield-Hubbell Storm Outlet—outlet for storm flow from Southfield and Hubbell Dists., **$4[illegible]000;** Part II, Schoolcraft Arm, west to Rouge River and extending east to Hubbell Dist., **$2,800,000;** Part III, addnl. arms similar to Schoolcraft arm meeting requirements, **$9,200,000;** Part IV, dredging Rouge River to enlarge storm flow capacity, **$1,000,000.** G. R. Thompson, city engr.

Mich., River Rouge—City, plans underway sewage pumping station, new pump[illegible], **$80,000;** garbage incinerator, **$50,000.** [illegible] L. Brown & Sons, 120 Madison Ave., Detroit, consult. engrs.

Neb., Hastings—City, E. I. Dier, clk, City Hall, exten., imprv. sewage plant. $5[illegible],000. P. T. Naylor, city engr.

N. Y., Bellerose—President Queens Boro, M. A. FitzGerald, comr. Boro Wks., 120-55 Queens Blvd., Kew Gardens, Zone 15, plans underway sanitary sewer 256 St. from 87 Ave., southern location to 87 Ave. northern location, etc., (PQS-44), **$113,400.** W. H. Bertram, asst, engr. in charge of sewers.

N. Y., Elmhurst—President Queens Boro, M. A. FitzGerald comr. Boro Wks., 120-55 Queens Blvd., Kew Gardens, Zone 15, plans underway combined sewer, 82 Pl. from Penelope Ave. to Cowles Court, etc., (PQS-42). **$28,210.** W. H. Bertram, asst. engr. in charge of sewers.

N. Y., Flushing—President Queens Boro, M. A. FitzGerald, comr. Boro Wks., 120-55 Queens Blvd., Kew Gardens, Zone 15, plans underway combined sewer 153 St. from 79 Ave. to Grand Central Parkway, southside (PQS-45). **$33,510.** W. H. Bertram, asst. engr. in charge of sewers.

N. Y., Hollis—President Queens Boro, M. A. FitzGerald, comr. Boro Wks., 120-55 Queens Blvd., Kew Gardens, Zone 15, plans underway storm sewer in Farmers Blvd. from Woodhull to Liberty Aves., (PQS-52). **$40,300.** W. H. Bertram, asst. engr. in charge of sewers.

N. Y., Jamaica—President Queens Boro, M. A. FitzGerald, comr. Boro Wks., 120-55 Queens Blvd., Kew Gardens, Zone 15, plans underway, storm sewer in Jamaica Ave. from Metropolitan Ave. to Sutphin Blvd., (PQS-50), **$200,000;** storm sewer (second barrel) in Liberty Ave. from 150 to Tuckerton Sts., (PQS-53), **$12,900.** W. H. Bertram asst. engr. in charge of sewers.

N. Y., Kew Gardens—President Queens Boro, M. A. FitzGerald, comr. Boro Wks., 120-55 Queens Blvd., Zone 15, plans underway combined sewer, 132 St. prolonged from Union Turnpike, southside, to 82 St., etc., (PQS-43). **$37,320.** W. H. Bertram, asst. engr. in charge of sewers.

★ **N. Y., New York**—President Manhattan Boro, W. D. Binger, comr. Boro Wks., Municipal Bldg., Zone 7, plans completed sewers in Amsterdam Ave. from 72 to 75 Sts., (PM-56), **$300,000;** 8 Ave. from 143 to 147 Sts., (PM-59), **$155,000;** Bway. from 142 to 150 Sts., (PM-60), **$130,000;** Dyckman St. from Payson Ave. to Hudson River (PM-61), **$100,000.** D. G. Edwards, ch. engr.

N. Y., Richmond Hill—President Queens Boro, M. A. FitzGerald, comr. Boro Wks., 120-55 Queens Blvd., Kew Gardens, Zone 15, plans underway storm sewer in Jamaica Ave. from 116 St. to Metropolitan Ave., (PQS-49), **$200,000.** W. H. Bertram, asst. engr. in charge of sewers.

N. Y., St. Albans—President Queens Boro, M. A. FitzGerald, comr. Boro Wks., 120-55 Queens Blvd., Kew Gardens, Zone 15, plans underway storm sewer in 177 St. from Sayres to 109 Ave., etc., (PQS-51). **$70,300.** W. H. Bertham, asst. engr. in charge of sewers.

★ **N. Y., Woodhaven** — President Queens Boro, M. A. FitzGerald, comr. Boro Wks., 120-55 Queens Blvd., Kew Gardens, Zone 15, plans completed storm sewers, Jamaica Ave. from Brooklyn Boro Line to 88 St., (PQS-46), **$200,000;** Jamaica Ave. from 88 to 102 Sts., (PQS-47), **$200,000;** Jamaica Ave. from 102 to 116 Sts., (PQS-48), **$200,000.** W. H. Bertram, asst. engr. in charge of sewers.

N. D., Mandan—City, S. E. Arthur, aud., City Hall, surveys storm and sanitary sewers, pre-sedimentation basin at water filtration plant, imprv. water distr. sys., connections, new water reservoir, sewage plant. **$50,000.** Burns & McDonnell, 107 W. Linwood Blvd., Kansas City, Mo., consult. engrs.

★ **Wis., West Allis**—City, 7525 W. Greenfield Ave., Z 14, sanitary and storm sewers. **$725,000.** P. Burbach, city engr.

N. B., Lancaster (Postal District Saint John)—Parish of Lancaster, c/o E. Claude Seeley, Lancaster, sewers. **$275,000.** D. R. Smith, City Hall, Saint John, engr.

Ont., Chatham — Municipality, sewage treatment plant, **$50,000** or more. F. M. S. Kingston, City Hall, engr.

Ont., Fort Francis—Municipality, sewage treatment plant, **$40,000.** Geo. Henry, Town Hall, engr.

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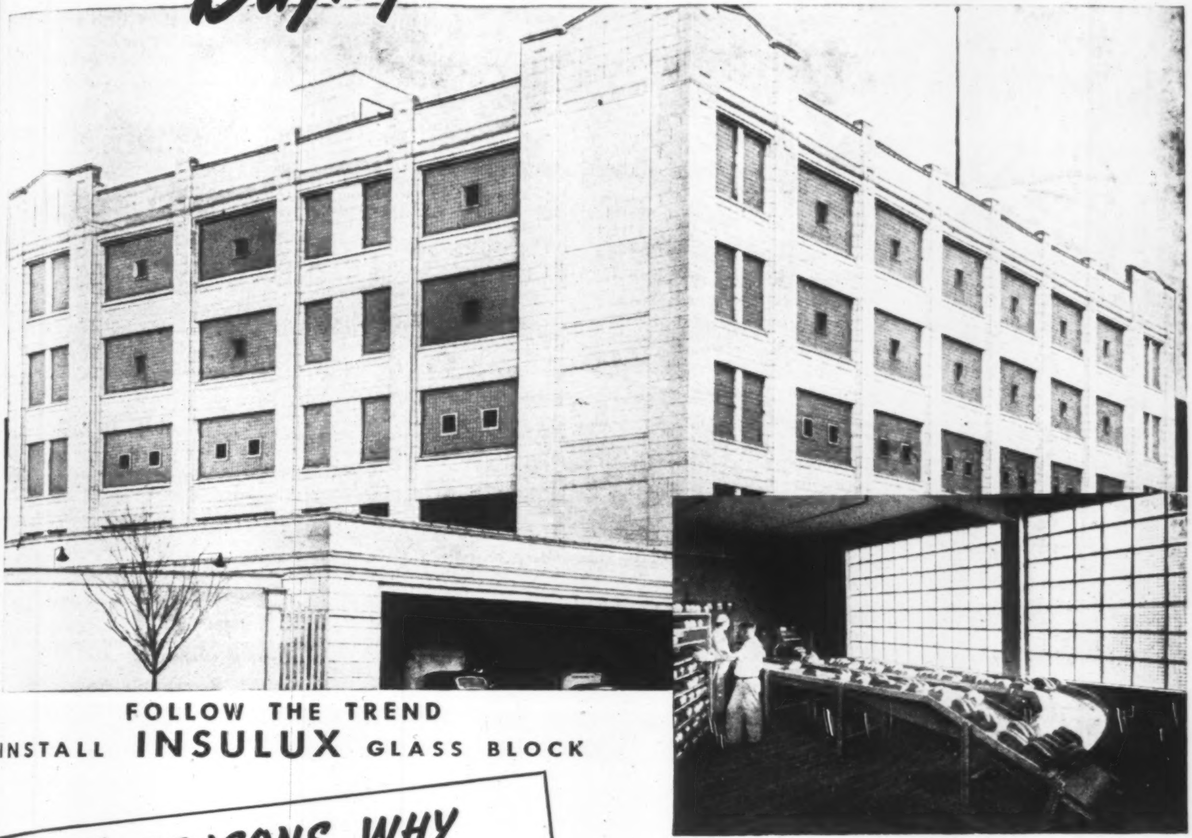

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Furthermore—panels of Insulux flood workrooms with natural daylight—improve working conditions—allow full use of floor space.

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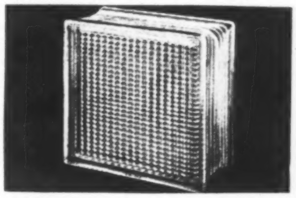
Insulux Glass Block is a functional building material—not merely a decoration. It is designed to do certain things that other building materials cannot do. Investigate!



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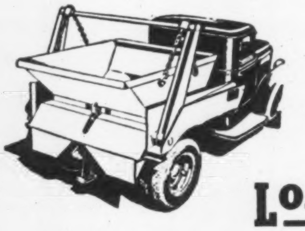

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POSTWAR PROJECTS (Cont'd.)

Ont., London—City, preliminary pl exten. East End and West End sew disposal plants and de-watering plant ing sludge cake available as fuel, **$200,00** preparing report incinerator, **$100,000.** C M. Veitch, city engr. CD 2/28—ENR 3/

Ont., London—City, enlarging sew disposal plants, about **$75,000;** enlarging on-structing new incinerator, about **$65,0** Col. M. M. Veitch, c/o owner, engr.

Ont., Port Arthur—Municipality, tru and lateral sewers in Brent Park area. **$,000.** S. E. Flook, City Hall, engr.

Ont., Simcoe—Municipality, concre settling basin adjacent to main sewage mp. station, exten. sewer mains with late onnections serving several outlying stre and parts of streets. **$75,000.** Pub. U ties Comn., Simcoe, engr.

Ont., Timmins—Municipality, A. L. aw, clk., exten. sanitary sewers. **$61,157;** 590 ft. storm sewers. **$140,210;** sewage d sal plant exten., **$60,000.** J. D. MacLean, wn Hall, engr.

Que., Hull—City, R. Brunet, mayor, wer construction. **$163,000.** T. Lancto c/o owner, engr.

★**Que., Quebec City**—Municipality, wer from St. John St. to St. Charles er, **$250,000;** underground canalization of ret River, St. Michael stream, **$250,000.** E. Hamel, City Hall, city engr.

Que., Quebec City—Municipality, cons ucting main pump. station St. Andrew St and deep water outfall sewer, collector ewer and syphon across River. **$100,000.** E. Hamel, City Hall, city engr.

Sask., Saskatoon — Municipality, exten. sewers, **$200,000;** storm sewers, **$200,000.** G. D. Archibald, City Hall, city engr. CD 1/17—ENR 1/27.

BRIDGES

PROPOSED WORK

Calif., Davis—City, underpass, **$100,000.**

★**Calif., Fresno**—City, bridges, underpasses. **$505,000.**

Calif., Woodland—Yolo Co., Woodland, bridge over Sacramento River at Elkton. **$250,000.**

New York—State Dpt. P. Wks., Albany, Zone 1, steel, concrete hy. bridge over Moon Brook on Route 60, 2 mi. north Jamestown, Chautauqua Co., replacing temporary span erected following washout by flood in 1943. **$25,000.**

N. S., Halifax—Municipality, bridge exten. from St. John's cemetery over Canadian Natl. R. R. tracks and beyond Fairview railway station, **$250,000.**

Ont., Hamilton — Municipality, overhead bridge at Kennilworth Ave. and Ottawa St. **$300,000.**

PLANS UNDERWAY

Ind., Anderson—City of Anderson and Madison Co., Anderson, 2 concrete bridges over White River on bypasses around city on east and west sides at city limits, one on Raible Ave., extended at western limits of city and other on Scatterfield Rd. extended at eastern limits, **$100,000;** C. V. Anderson, co engr.; widening with 20 tracks present underpass at Marine Dr. under New York Central R. R. yards, new underpasses under Pennsylvania and New York Central R. R. tracks at each side of city and new underpasses under New York Central R. R. tracks southeast of city on west side bypass, **$50,000,** V. Lee, city engr., and C. V. Windsor, Anderson, co. engr.

Ind., Hobart—Bd. Comrs. Lake Co., E. H. Swartz, aud., Court House, Crown Point, bridge over Deep River, **$35,000.** Wm. J. Schroeter, Court House, Crown Point, engr.

Ind., Richmond—Wayne Co., Court House, 4 and Main Sts., replacing worn out bridge over Whitewater River, **$130,000.** G. Gault, co. engr.

Kan., Wellington—Sumner Co., 3 steel plate girder and 10 rein.-con. bridges. **$40,000.** R. C. Kirk, Wellington, co. engr.

Mich., Detroit—Wayne Co., Road Comn., 3800 Barlum Tower, plans underway highway grade separation and concrete, steel bridge at intersection of Hines Dr. and Ann Arbor Rd. **$75,000.** L. C. Smith, Co. Road Comn., engr.

Missouri—State Hy. Comn., Jefferson City, plans 90% completed two 10 ft. rein.-con. slab span, culvert type bridges over Southwest fork of Boone Creek, Route 66, Proj. FA 248 D(2), **$18,000;** two 12 ft. concrete slab span, culvert type bridge over Little Bourveise River, road from Cuba to Bourbon, Route 66, Proj. FA 248 B(2), **$9,100,** both Crawford Co.; two 12 ft. rein.-con. slab span culvert type bridge over Keever Branch state road from Jasper East, Route SK Proj. FAS 394 B(2), Jasper Co., **$5,000;** two 12 ft. rein.-con. slab span culvert type bridge over Windsell Curb Road from Sullivan to St. Clair, Route 66, Proj. FA 258 A(2), **$18,000;** one 35 ft. and two 25 ft. I-Beam span, dual structures steel pile bents to rock over Windsell Creek, Route 66, Proj. FAS 258 A(2), **$38,000,** both Franklin Co. C. W. Brown, ch. engr.

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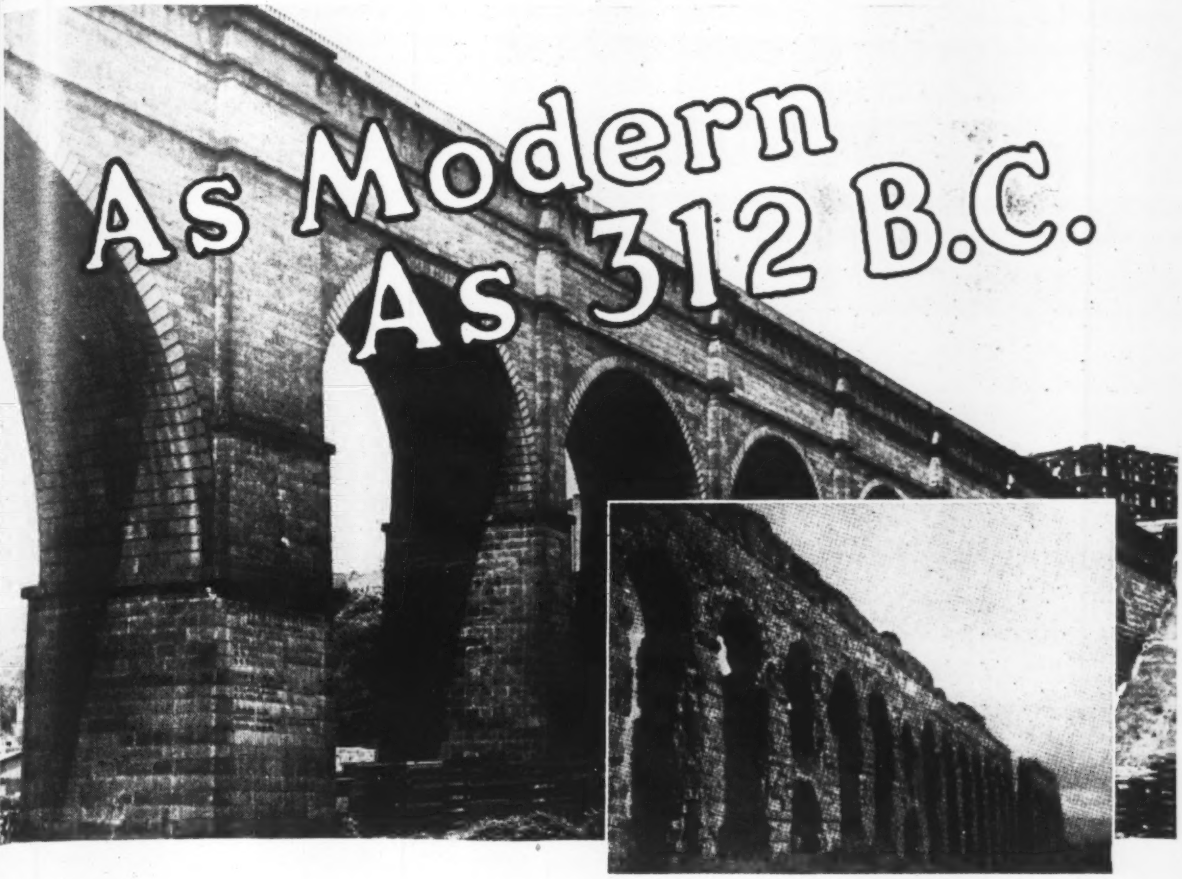

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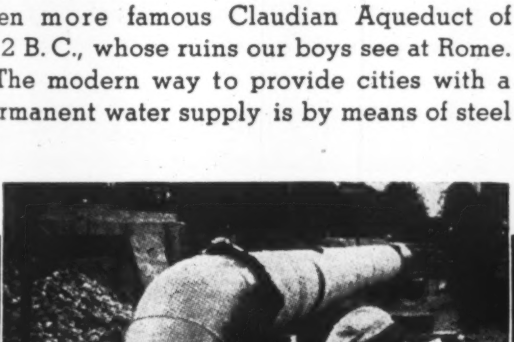

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POSTWAR PROJECTS (Cont'd.)

Missouri—State Hy. Comn., Jeff[illegible]n City, plans 90% completed, raising, [illegible] structure consisting two 45 ft. a[illegible] ft. concrete deck girder spans, [illegible] concrete bents on creosoted piling and a[illegible]g two 20 ft. concrete slab spans on conc[illegible] bents on concrete piling over Middle [illegible]ork of Chariton River, Route 24, from [illegible] Salisbury to Moberly, Proj. FA 795-F(2); [illegible] seventeen 20 ft. concrete slab spans, concrete [illegible]nts on creosoted timber piling and addi[illegible] two 20 ft. slab spans, concrete bents on [illegible] creosoted timber piling over overflow of Mi[illegible]e Fork of Chariton River, Chariton Co.

N. Y., Falconer—Chautauqua Co. [illegible]. Dpt., 454 N. Work St., repairs, recon[illegible]uction, imprvs. various county-owned hy. [illegible]ridges, **$75,000-$150,000.** B. Chilson, co. [illegible]gr.

★ **N. Y., New York**—President M[illegible]hattan Boro, W. D. Binger, comr. B[illegible] Wks., Municipal Bldg., Zone 7, plans c[illegible]pleted East River Dr. viaduct from E. [illegible] to E. 23 Sts. (PM-46), **$1,980,000;** River[illegible]le Dr. Viaduct, 153 to 155 Sts. (PM-40), [illegible]53,000. D. G. Edwards, ch. engr. CD 1/[illegible]—ENR 1/28.

N. Y., New York—President M[illegible]hattan Boro, W. D. Binger, comr. Bor[illegible] Wks., Municipal Bldg., Zone 7, plans u[illegible]erway grade separation at St. Nicholas [illegible] and 155 St., (PMS-175) **$200,000.** State A[illegible] Planning Funds allotted. D. G. Edwa[illegible]s, ch. engr.

★ **O., Cleveland**—City, S. F. Da[illegible], dir. Pub. Serv., City Hall, plans underway Abbey St. Bridge between W. 14 St. and Lorain Ave., **$1,350,000;** Detroit Ave. bridge over N. Y. C. and St. L. R. R., **$367,000;** E. 34 St. Bridge over Kingsbury Run, **$1,332,000;** E. 55 St., bridge over W. & L. E. R. R., **$630,000;** Main Ave. Bridge over Cuyahoga River, **$850,000;** new Central Viaduct, **$3,064,800;** Fulton Rd. Bridge over C. C. C. & St. L. R. R., **$528,000;** E. 152 St. bridge over N. Y. C. R. R., **$270,000;** repairing Center St. Bridge over Cuyahoga River, **$150,000;** Jefferson Ave. Bridge, **$100,000;** Willow St. bridge over Cuyahoga River, **$100,000.** Financing not yet provided for. J. M. Heffelfinger, 518 City Hall, engr. CD 3/1/43 and 12/10/43—ENR 3/4/43 and 12/30/43.

★ **O., Cleveland**—City, S. F. David, dir. Pub. Service, City Hall, plans 5[illegible] completed bridge carrying highway over Big Creek in Brookside Park, **$32,000;** bridge under B. & O. R. R. at West Blvd. bridge, **$175,000;** grade separations at E. 26 St. and Pennsylvania R. R., **$772,000;** at E. 26 St. and N. Y. C. R. R., **$740,000;** at E. 26 St. and Lakefront Highway, **$561,000;** legal obstacles to be overcome and financing not yet provided for; plans repairing Eagle Ave. Bridge over Cuyahoga River, **$35,000;** widening E. 55 St. under N. Y. C. bridge, **$110,000;** grade separation E. 75 St. and W. & L. E., **$415,200;** E. 55 St. and Lakefront highway separation, **$796,000;** E. 7[illegible] St. bridge exten. under Erie R. R., **$354,000,** financing not yet provided for. J. M. Heffelfinger, 518 City Hall, bridge engr. CD 12/1[illegible]—ENR 12/16.

★ **Pennsylvania**—State Hy. Dpt., Harrisburg, highway grade separation proj., interchange north of proposed Georgetown-Glasgow bridge, north approach to proposed bridge necessitating interchange with Route 68, **$97,200;** interchange at intersection Routes 30 and 168, relocation approach of 168 to proposed Georgetown-Glasgow bridge and imprv. U.S. Route 30, **$102,600;** interchange at intersection Routes 18 and 30 maintaining Route 30 a freeway with other major hy. grade separation, **$102,600;** interchange at north end proposed Midland-Shippingport Bridge, constructing proposed bridge will demand definite interchange structure at north end of bridge with Route 68 eliminating certain traffic flow problems, **$86,400;** east and west end proposed Fallston Bridge, east end of bridge interchange eliminating cross-traffic on proposed Ohio River Blvd. west end interchange connecting with Route 51, **$324,000;** hy. grade separation to Brady's Park for eliminating cross-traffic at Route 51, **$86,400;** interchange at intersection Routes 51 and 168, relocation Route 51 and imprv. Route 168 with contemplated increase of traffic on 51 will demand traffic separation at intersection south of Darlington Borough, **$86,400,** all Beaver Co. Financing not yet provided for. M. J. Baker, Jr., Rochester, consult. engr.

Alta., Medicine Hat—Municipality, F. Blackburn, city clk., subway under Canadian Pacific R. R. tracks, **$100,000.** J. E. Armstrong, ch. engr. Canadian Pacific R. R., Windsor Station, Montreal, Que., in association with municipality, engrs.

Ont., Port Arthur—Municipality in association with Provincial Govt., bridge on Trans-Canada Highway, **$150,000.** S. E. Flook, City Hall, in association with Dpt. Hys., Toronto, engrs.

★ **Que., Quebec City**—Municipality, in association with Canadian National Railway Co., H. A. Dixon, ch. engr., 360 McGill St., Montreal, subway at Crown St., **$200,000;** subways to eliminate level crossings at Bridge and Marie Incarnation Sts., **$350,000.** E. Hamel, City Hall, city engr. CD 1[illegible]12—11/18.

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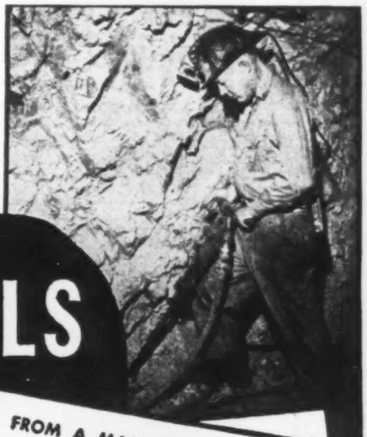

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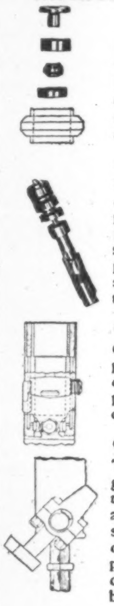

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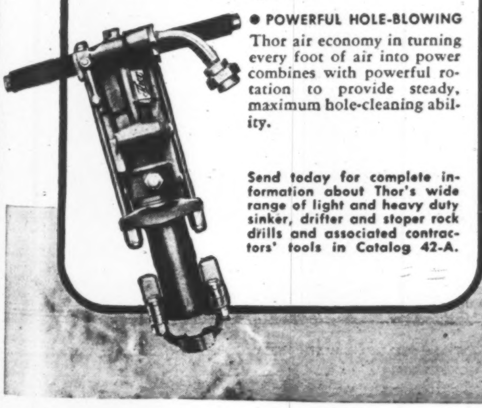

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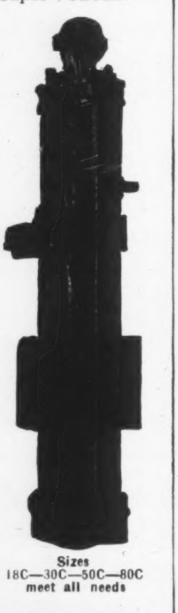

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POSTWAR PROJECTS (Cont'd.)

Que., Quebec City—Municipality, viaduct over St. Vallier St., as part of Blvd. following St. Cyrille St. along to St. Paul St. **$200,000.** E. Hamel, City Hall, city engr.

STREETS AND ROADS

PROPOSED WORK

★**Calif., Fresno**—City, street imprvs. **$2,310,000.**

★**Calif., San Jose**—Santa Clara Co., San Jose, road projects. **$2,802,000.**

Kan., Atchison—D. Van Ness, city mgr., City Hall, roads and streets, **$173,798.**

Mo., Boonville—City, resurfacing streets. **$35,000.**

★**New Hampshire**—State Hy. Dpt., Concord, road mix 8 mi. Northwood to Lee, **$400,000;** 6 mi. Nashua and Hollis, **$340,000;** surface treated gravel 5 mi. Newport and Sunapee, **$350,000;** road mix and bridges 2.2 mi. Milton, **$300,000;** plant mix 5 mi. Hudson, **$300,000;** plant mix and bridges 4.5 mi. Wilmot and Milford, **$530,000.** Financing not yet provided for. CD 8/2—ENR 8/24.

N. Y., Poughkeepsie—Comrs. Dutchess Co., imprv. road. **$39,900.** State Aid Planning Funds allotted.

O., Fostoria—City, F. E. Blaser, Ser. Dir., City Hall, $40,000 bond election Nov. 7, widening Main St. CD 7/20—ENR 8/10.

★**Ont., Toronto**—Dpt. Planning & Development, Parliament Bldgs., Toronto, 116 mi. highway to Red Lake, to mining area in Kenora-Rainy River Dist., **$2,500,000-$3,000,000.**

PLANS UNDERWAY

★**Illinois**—State Hy. Dpt., Springfield, 20 mi. concrete hy. belt line around Cairo tieing in with proposed super hy., Alexander Co. **$600,000.** W. W. Polk, ch. hy. engr.

Ill., Decatur—City, City and County Bldg., plans completed resurfacing N. Jasper St., Sangamon to Garfield Sts., **$50,000;** widening, resurfacing E. Packard St., Main to Water Sts., **$25,000.** Financing not yet provided for. J. M. Weir, city engr. CD 10/18—ENR 10/21.

★**Ill., Decatur**—City, City & County Bldg., plans 95% completed widening, repaving E. Wood St., Maffit St. to Nelson Blvd., **$265,000;** plans 50% completed widening, resurfacing S. Franklin St., Macon to Ruth Sts., **$75,000;** plans 25% completed paving N. Monroe St., I. C. R. R., to McKinley Ave., **$63,000;** plans resurfacing N. Monroe St., Eldorado St. to I. C. R. R., **$75,000;** elimination of jog at Monroe and Eldorado Sts., **$10,000;** widening, resurfacing S. Monroe St., Main to Wood Sts., **$15,000;** E. and W. Grand Sts., city limits to Woodford St., **$300,000;** opening, paving cut off along B. & O. R. R., Williams to Eldorado Sts., **$30,000;** exten., paving S. Bway. St., Garrison St. to Route 47, **$30,000;** widening, paving, resurfacing N. and S. Bway., Garrison St. to city limits, **$225,000.** J. M. Weir, city engr.

Ill., Eldorado—City, City Bldg., making plans asphalt resurfacing Locust, 4 and Organ Sts., etc. **$75,000.** R. D. Brown, County Bldg., Saline Co. supt. hys.

Ill., Mt. Vernon—Jefferson Co., Court House, plans 40% completed gravel or crushed stone surfacing 8½ mi. State Aid 12 from Mt. Vernon northwest, **$50,000;** plans 65% completed 4 mi. State Aid 9, beginning 1 mi. west Waltonville, etc., **$30,000;** plans 80% completed 2 mi. State Aid 16 running south 2 mi. from Marion Co. line, incl. 70 ft. steel bridge, **$25,000;** plans 50% completed 4¼ mi. State Aid 17 from Boueford north to S.B.I. 15, **$25,000;** plans 40% completed 5 mi. beginning S.B.I. Route 148, running north and east to S.B.I. 148, **$40,000;** plans 4 mi. from Emerson City west and north to Scheller, **$25,000;** 6½ mi. S.B.I. 15, running north and west to Richview, **$45,000;** 5 mi. State Aid Route 5 and 6B running north from Franklin-Jefferson Co. line, **$40,000;** 5 mi. S.B.I. Route 37, running east to State Aid Route 5, $40,000. T. C. Pitchford, Co. Court House, co. supt. hys.

Ind., Anderson—City, paving 16 St. from Arrow to Raible; widening, Marine Dr. and Madison Ave., 27, 25, 22 and 29 Sts. **$75,000.** V. Lee, city engr.

Ind., Anderson—Madison Co., Anderson, 15 mi. concrete highway from Anderson to Elwood, incl. grading, culverts and small concrete bridges over 2 creeks, **$350,000;** new road connecting State Road 109 at Ohio Ave. to E. 10 St., extended and from Grand Ave. from 10 St. to State Road 9, **$40,000;** new highway from state highway to southwest of Anderson, running north and connecting with new Anderson-Elwood Hy., **$80,000.** C. V. Windsor, Anderson, co. engr.

★**Mich., Detroit**—Dpt. P. Wks., City Hall, plans 59% completed pavement widening, imprv. following streets: McNichols, Stoepel to Wyoming Ave., **$60,000;** Puritan, Log Cabin to Livernois, **$70,000;** Nardin Park at West Chicago Blvd., **$4,000;** Davison Ave., Livernois to Wyoming Ave., **$200,000;** Holbrook Ave., G.T. R.R., to St. Aubin Ave., **$50,000;** Cadillac Sq., Woodward Ave. to Congress St., **$60,000;** Monroe Ave., Woodward to Randolph St., **$40,000;** St. Aubin Ave., Brewster to Adele St., **$186,000.** Geo. R. Thompson, City Hall, city engr. CD 8/16—ENR 9/7.

★**Mich., Detroit**—Wayne Co. Road Comn., 3800 Barlum Tower, plans underway concrete widening, resurfacing Seven Mile Rd. from Gratiot to Morang Ave., $30,000; Five Mile Rd. from Wyoming to Telegraph Rd., **$440,000;** Fort St. from Dumfries Rd. to Lincoln Park, **$300,000;** concrete resurfacing Greenfield Rd. from Allen to Base Line Rd., **$780,000;** concrete paving, grading and drainage structures Inkster Rd. from Schoolcraft to Base Line Rd., $307,000; Eureka-Savage Rd. from Huron River Dr. to Haggerty Rd., **$138,000;** Cherry Hill Rd. from Merriman to Venoy Rd., $60,000; Venoy Rd. from Michigan Ave. to Cherry Hill Rd., **$138,000;** Base Line Rd. from Farmington to Taft Rds., **$500,000;** Pennsylvania Rd., from Allen Rd. to W. Jefferson Ave., **$270,000;** Sibley Rd. from Fort St. to Huron River Dr., **$850,000.** L. C. Smith, 3800 Barlum Tower, engr.

★**Mich., Detroit**—Wayne Co. Road Comn., 3800 Barlum Tower, plans underway grading, drainage 22 ft. concrete pavement Beech-Daly Rd., **$767,000;** 11 mi. Hines Dr., **$850,000;** widening, resurfacing Six Mile Rd. from Wyoming Ave. to Lasher Rd., $340,000; Seven Mile Rd., Schaefer to Grand River Ave., **$610,000.** L. C. Smith, Co. Road Comn. engr.

Mich., Eloise—Wayne Co., Eloise Hospital, County Bldg., plans completed concrete pavement and sidewalk replacement, $50,000. Financing not yet provided for. L. C. Smith, 3800 Barlum Tower, co. hy. engr.

New York—State Dpt. P. Wks., State Office Bldg., Albany, Zone 1, plans underway relocating Route 60, 4 mi. north of Jamestown, incl. erecting overpass, steel, concrete over county-owned hy. at Kimball Stand, Chautauqua Co. **$250,000.**

N. Y., Douglaston—President Queens Boro, M. A. FitzGerald, comr. Boro Wks., 120-55 Queens Blvd., Kew Gardens, Zone 15, plans underway repaving Horace Harding Blvd. from Douglaston Ave. to Nassau Co. line (PQS-56), **$78,400.** A. K. Johnson, asst. engr. in charge of highways.

N. Y., Falconer—Chautauqua Co. Hy. Dpt., 454 N. Work St., extensive rehabilitation, repaving, exten. county-owned hy. sys. **$250,000-$400,000.** B. Chilson, co. supt. hys. and co. hy. engr.

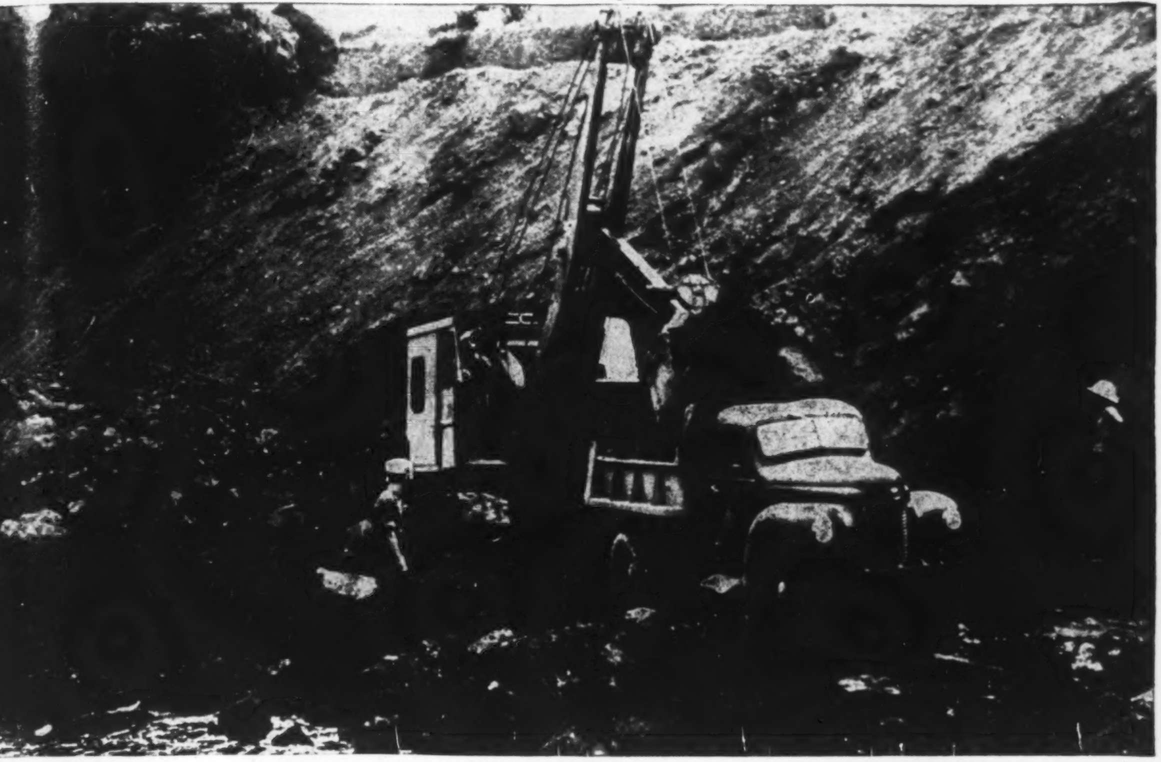
N. Y., Flushing—Queens Boro President, M. A. FitzGerald, comr. Boro Wks., 120-55 Queens Blvd., Kew Gardens, Zone 15, plans underway repaving Roosevelt Ave. from Willets Pt. Blvd. to Flushing River (PQS-58), **$60,000.** A. K. Johnson, asst. engr. in charge of highways.

N. Y., Jamaica—President Queens Boro, M. A. FitzGerald, comr. Boro Wks., 120-55 Queens Blvd., Kew Gardens, Zone 15, plans underway repaving Archer Ave. from Van Wyck Blvd. to Sutphin Blvd. (PQS-57), **$9,800;** reconstructing Linden Blvd. from Sutphin Blvd. to Hawtree Creek Rd. (PQS-63), **$200,000.** A. K. Johnson, asst. engr. in charge of highways.

★**N. Y., New York**—President Manhattan Boro, W. D. Binger, comr. Boro Wks., Municipal Bldg., Zone 7, plans 20% completed East River Dr. from Grand to [illegible] Sts., incl. E. Houston St. Connection (PM-41 & 42), **$1,545,000;** plans 40% completed Harlem River Dr. from 2nd Ave. to River Speedway, incl. bulkhead (PM-43), **$15,055,000;** plans underway widening, regrading Houston St. from 6 Ave. to East River Dr. (PM-47), **$2,488,000.** D. G. Edwards, ch. engr.

★**N. Y., New York**—President Manhattan Boro, W. D. Binger, comr. Boro Wks., Municipal Bldg., Zone 7, repaving Lafayette St., Foley Sq. to 8 St., (PMS-210), **$132,300;** Amsterdam Ave., 72 to 78 Sts., (PMS-213), **$9,163;** Lewis St., Grand to Delancey Sts., (PMS-220), **$5,490;** Morningside Ave., 125 to 126 Sts. (PMS-227), **$6,705;** Morton St., Huston to Washington Sts., (PMS-228), **$9,855;** New Bowery, Oak St. to Chatham Sq., (PMS-230), **$22,230;** Division St., Suffolk to Pitt Sts., (PMS-198), $5,600; Edgecombe Ave., 145 to 155 Sts., (PMS-200), **$11,000;** Frankfort St., Gold to Williams Sts., (PMS-202), **$5,850;** Gansevoort St., W. 4 to West Sts., (PMS-203), **$20,475;** Greene St., Bleecker to 8 Sts., (PMS-206), $18,540; Hancock Pl., St. Nicholas to Morningside Aves., (PMS-207) **$5,813;** Columbus Ave., 59 to 96 Sts., (PMS-190) **$218,970;** Clinton St., south to Madison Sts., (PMS-191), $16,493; Convent Ave., 130 to 133 Sts., and 134 to 138 Sts., (PMS-192), **$14,025;** Convent Ave., 138 to 140 Sts., (PMS-195), $6,510; Delancey St., East River Dr. to Cannon St., (PMS-196), **$36,540;** Ave. A, 20 to 24 Sts., (PMS-179), **$27,400;** Academy St., Seaman to Vermilyea Aves., (PMS-180), $22,500; Baxter St., Walker to Grand Sts., (PMS-184), **$5,625;** Bway., 125 to 135 Sts., (PMS-185), **$81,027;** Charlton St., MacDougal to Greenwich Sts., (PMS-188), **$5,000;** Cabrini Blvd., 177 St. to 181 St., and 186 to 190 Sts., (PMS-189), **$19,150;** 14 St., 2 to 9 Aves., (PMS-311), **$84,780;** 15 St., 6 to 9 Aves., (PMS-312), **$10,313;** 21 St., 1 to 3 Aves., (PMS-319), **$5,463;** 21 St., East River Dr. to 1 Ave., (PMS-320), **$21,105;** 66 St., 3 to Lexington Aves., (PMS-322), $6,615; 25 St., 3 to Lexington Aves., (PMS-327), **$7,155;** 10 St., 5 to 6 Aves., (PMS-304), **$14,130;** 10 St., Hudson to Washington Sts., (PMS-305), **$7,245;** 10 Ave., 14 to 30 Sts., (PMS-307), **$67,500;** 10 Ave., 30 to 42 Sts., (PMS-308), **$80,370;** Amsterdam Ave., 60 to 71 Sts., (PMS-309), **$63,000;** 10 Ave., Acad-

Land Battle Wagon....



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emy to 207 Sts., (PMS-31), **$42,660**; 5 Av
East Side, 110 to 118 Sts., (PMS-283), **$**
470; 5 Ave., 118 to 120 Sts., (PMS-28
$17,235; 15 St., East River Dr. to Ave.
(PMS-286), **$14,896**; 34 St., 8 to 10 Av
(PMS-290), **$12,562**; 9 St., 3 Ave. to Univ
sity Pl., (PMS-302), **$5,538**; 7 Ave., 30
34 Sts., (PMS-271), **$33,750**; 8 Ave., 135
145 Sts., and 150 to 155 Sts., (PMS-27
$92,000; 8 Ave., 155 to 159 Sts., (PMS-2
$37,175; 9 Ave., Little West 12 to W.
Sts., (PMS-275), **$200,000**; 9 Ave., W. 36
59 Sts., **$199,735**; Madison Ave., 125 to
Sts., (PMS-278), **$9,525**; 95 St., 1 to 2 Av
(PMS-253), **$10,170**; 112 St., 3 to Madi
Aves., (PMS-256), **$5,100**; Worth St., Bw
to Church St., (PMS-261), **$7,425**; 4
Lewis St. to 2 Ave., (PMS-265), **$15,7**
5 Ave., 60 to 110 Sts., (PMS-268), **$**
000; 6 St., East River Dr. to Lewis
$7,785; St. Nicholas Ave., to 169 St. to
George Ave., (PMS-243), **$198,585**; Tra
verse Rd. 2, 79 St. and 5 Ave. to Cent
Park West (PMS-244), **$41,085**; Vandewa
St., Frankfort to Pearl Sts., (PMS-24
$5,805; Vermilyea Ave., Dyckman to
Sts., (PMS-247), **$50,265**; West and M
ginal Sts., Battery Pl. to Gansevoort
(PMS-249), **$120,000**; Park Ave., 31 to
Sts., (PMS-232), **$22,612**; Park Ave., 34
42 Sts., (PMS-233), **$22,750**; Park Ave.,
to 59 Sts., and 64 to 96 Sts., (PMS-23
$160,000; Pearl St., Fulton St. to New Bo
ery, (PMS-235), **$25,627**; Sherman Ave.,
Bway., (PMS-239), **$116,640**; St. Nicho
Ave., 114 to 121 Sts., (PMS-242), **$17,**
37 St., 9 to 10 Aves., (PMS-292), **$11,**
grading, paving Leyden St., W. 225 St.
Tennison Pl., (PMS-174), **$150,000**; 142
Hudson River Outlet Exten., (PMS-17
$20,000; 152 St., Hudson River Outlet Exte
(PMS-177), **$35,000**; 158 St., Hudson Ri
Outlet Exten., (PMS-178), **$10,000.** St
Aid Planning Funds alloted. D. G. Edwar
ch. engr.

N. Y., Queens Village—President Que
Boro, M. A. FitzGerald, comr. Boro W
120-55 Queens Blvd., Kew Gardens, Zone
plans underway repaving Union Turnpi
from 188 St. to Nassau Co. line (PQS-5
$196,000. A. K. Johnson, asst. engr.
charge of highways.

N. Y., St. Albans—President Queens Bo
M. A. FitzGerald, comr. Boro Wks., 120-
Queens Blvd., Kew Gardens, Zone 15, pla
underway reconstructing Merrick Rd.
Proctor Hobson Park (PQS-61), **$45,**
A. K. Johnson, asst. engr. in charge
highways.

N. Y., Springfield Gardens—Preside
Queens Boro, M. A. FitzGerald, comr. Bo
Wks., 120-55 Queens Blvd., Kew Garde
Zone 12, plans underway reconstructi
Rockaway Blvd. from Southern Parkway
150 St. (PQS-60), **$200,000**; grading, pavi
Farmers Blvd. from Linden to Rockaw
Blvds. (PQS-54), **$200,000.** A. K. Johnso
asst. engr. in charge of highways.

N. Y., Woodside—President Queens Bo
M. A. FitzGerald, comr. Boro. Wks., 120-
Queens Blvd., Kew Gardens, Zone 15, pla
underway repaving Roosevelt Ave. fro
Queens Blvd. to 58 St. (PQS-59), **$200,**
paving under elevated structure on Quee
Blvd. between Van Dam St. and Rooseve
Ave. (PQS-62), **$125,000.** A. K. Johnso
asst. engr. in charge of highways.

O., Springfield—City, A. J. Dillon, mg
City Hall, plans 5% completed paving
mi. Park Blvd. from Rock Creek to Be
ment Ave.; Park Blvd., under N.Y.C.R.
near Mitchell Blvd., **$250,000.** Financing n
yet provided for.

Pa., Bradford—City Council, street wide
ing, paving, **$100,000.** J. H. Quirk, City Ha
city engr.

★ **Ont., Timmins**—Municipality, A.
Shaw, clk., 298,750 ft. concrete sidewalk
$127,826; 69, 639 ft. concrete paving, **$**
915; asphalt paving 294,521 sq. yd., **$4**
612; curbs, gutter 181,800 ft., **$109,380.** J.
MacLean, Town Hall, engr.

CONTRACTS AWARDED

Que., La Tuque—Municipality, A. Gagn
town mgr., constructing streets and sid
walks, day labor. **$150,000.**

EARTHWORK, WATERWAYS

PROPOSED WORK

★ **†Arizona**—Bureau Reclamation, Interi
Bldg., 19 and C Sts. N.W., Wash.,
D. C., authorized power installation, Boulde
Canyon Proj.; under study transmissi
lines, Parker Dam power proj., **$5,010,**
canals, pumps, Gila, Wellton-Mohawk U
Proj., **$9,420,000**; concrete dam, power pla
Bridge Canyon Proj., **$207,432,000**; tunne
aqueduct, canals, Colorado-Phoenix Dive
sion Proj., **$333,000,000**, all foregoing Co
orado River; concrete dam, Bill William
Alamo Reservoir Proj., Williams Rive
$3,200,000; earth dams, canals, Chino, Snow
flake, Winslow, Hassayampa, Holbrook a
miscellaneous projects, Little Colorado Rive
$16,633,000; concrete dam, power pla
Buttes Proj., Gila River, **$7,000,000**; co
crete dam, Coconino Proj., Little Colora
River, **$4,000,000**; earth dam, Sentinel Pro
Gila River, **$10,000,000.**

Calif., San Jose—Santa Clara Co., draina
program. **$300,000.**

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POSTWAR PROJECTS (Cont'd.)

★ **†Colorado**—Bureau Reclamation, Interi
Bldg., 19 and C Sts. N.W., Wash.,
D. C., authorized earth dam, canals, Paoni
Fire Mountain Division Proj., Gunnis
River, **$1,373,000**; concrete and earth dam
drains San Luis Valley Proj., Rio Gran
River, **$17,200,000**; under study 2 earth da
Laplata Proj., San Juan River, **$3,**
earth dam, canals, San Miguel Proj., S
Miguel River, **$1,500,000**; Hunter Mesa Pro
Colorado River, **$1,500,000**; Collbran, Plate
Creek, **$1,632,000**; Silt Proj., Rifle Cre
$1,245,000; West Divide Proj., Colorado Riv
$941,000; Florida Proj., Animas River,
500,000; canals, drains, Pine River Exte
Proj., Pine River, **$1,370,000**; earth and co
crete dams, canals, power plants, tunnel Bl
River-South Platte Proj., Blue River-Sou
Platte River, **$148,000,000**; dams, canals, mi
cellaneous projects, **$5,000,000**; earth da
3 power plants, Montrose Power Proj., U
compahgre River, **$3,850,000**; concrete a
earth dams, canals, tunnels, Gunnison-A
kansas, Proj. Gunnison River, **$84,**
earth dam, canals, drains, Upper Dolor
Proj., Dolores River, **$11,600,000**; earth da
Paonia—Minnesota Div. Proj., Gunnis
River, **$797,000.**

★ **†Idaho** — Bureau Reclamation, Interi
Bldg., 19 and C Sts. N.W., Wash.
D. C., authorized pump. plant, canal, Rat
drum Prairie-Post Falls Unit Proj., Spoka
River, **$300,000**; earth dam Mann Creek Pro
Mann Creek, **$930,000**; under study ear
dams, pump. plants, canals Mountain Ho
Proj., Snake River, **$90,000,000**; earth da
canals, Cambridge Bench Proj., Pine Cre
$360,000; Council Proj., **$500,000**; Mesa Pro
$300,000, both Weiser River; Malad Vall
Proj., Devil Creek, **$670,000**; Hornet Pro
Hornet Creek, **$300,000**; Lewiston Orchar
Proj., Sweetwater Creek, **$1,000,000**; concre
dam, power plant, Cabinet Gorge Pro
Clark Fork, **$12,600,000**; concrete dam, A
beni Falls Proj., Pend Oreille River, **$3,**
000; earth dam Challis Proj., Salmon Rive
$500,000; pump. plants, canals, Rathdru
Prairie Proj., Spokane River, **$2,700,**
dams, canals Medicine Lodge and misc
laneous projects, **$2,500,000**; 2 earth dam
canals Montpelier Proj., Bear River, **$3,**
000; earth dam, canal Paris Proj., Sleigh
Creek, **$500,000**; earth and concrete dam
power plant, Oneida Proj., Bear River, **$1**
000,000.

†Illinois—U. S. Eng., West Memphis, Ar
earth levee, beginning at point below Theb
on Ohio River and exten. 10 mi. south in
approx. 250,000 yd. earth and 2 flood gat
Alexander Co. **$125,000.**

★ **Ill., Jacob**—Fountain Bluff & DeGon
Drainage & Levy Dist., 16 mi. dirt leve
incl. floodgates, raising, widening prese
levee, 7,000,000 yd. earthwork, **$550,000-**
000.

★ **†Kansas**—Bureau Reclamation, Interi
Bldg., 19 and C Sts. N.W., Wash.
D. C., under study canals, diversion da
Bostwick Proj., Republican River, **$6,000,**
earth dams pumps, miscellaneous project
$1,000,000.

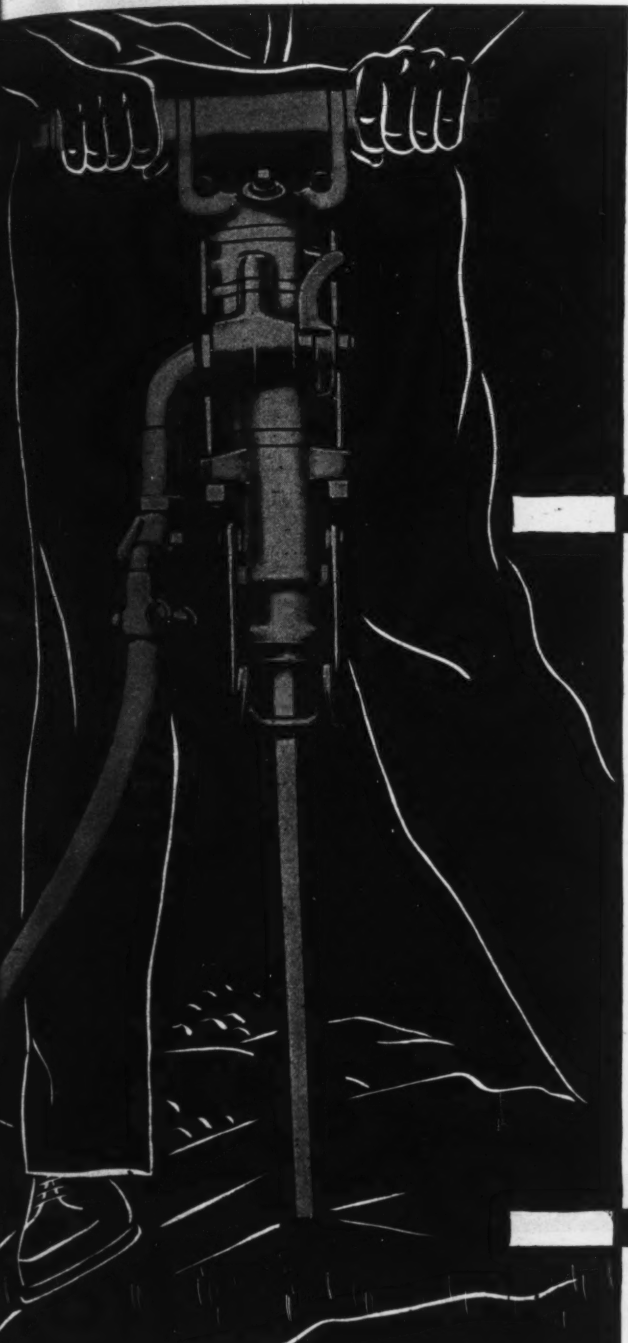
★ **Mich., Detroit**—Wayne Co. Port of D
troit Comn., 2333 Barlum Tower, add
port facilities on Detroit River waterfron
$300,000; pleasure craft harbor on Detro
River waterfront, incl. dredging, dock, a
mooring facilities, **$400,000**; cut-off chann
across Point Hennepin, Grosse Ile, Detro
River, Wyandotte vicinity, incl. dredgi
channel for navigation purposes, **$400,000,**

★ **†Montana**—Bureau Reclamation, Inte
ior Bldg., 19 and C Sts., N.W., Wash.,
D. C., authorized canals Bitterroot Vall
(Woodside) Proj., **$1,070,000**; under stud
earth dam, canals, drains remainder Bitte
root Valley Proj., **$2,814,000**, both Bitterro
River; authorized power transmission lin
Fort Peck Power Proj., Missouri Rive
$6,200,000; pumps, canals Intake Pum
Proj., Yellowstone River, **$62,000**; und
study canals, pumping plants Missoula Va
ley, Bitterroot River, **$172,000**; pumpi
plant, canals, drains Buffalo Rapids, thi
div., **$1,029,000**; pumps, canals, Savage Pro
$220,000, both Yellowstone River; 16 Missou
River Pumping projects, Missouri Rive
$2,391,000; South Bench Proj., Jeffers
River, **$718,000**; miscellaneous project
$5,000,000; pumping plants, canals Missou
Souris-Montana Div., Missouri River, **$**
030,000; Yellowstone River Pumping Pro
Yellowstone River, **$521,000.**

★ **†Nebraska**—Bureau Reclamation, Inte
ior Bldg., 19 and C Sts., N.W., Wash.,
D. C., under study earth dam, canals, Nor
Republican Proj., **$947,000**; earth da
canals, power plant, Bostwick Proj., **$2**
413,000, both Republican River; earth da
canals, Miscellaneous Projects, **$2,500,000**

★ **†Nevada**—Bureau Reclamation, Interio
Bldg., 19 and C Sts. N.W., Wash.,
D. C., under study diversion dam, canal
drains Humboldt Proj., Humboldt Rive
$374,000; pumps, canals, Fort Mohave Pro
Colorado River, **$123,000**; earth dam, pow
plant, canals Upper Truckee Proj., Truck
River, **$5,535,000**; earth dam, tunnels, canal
power plant Washoe Lake Proj., Lake Taho
$5,200,000; earth dams, canals miscellaneo
projects (Colorado River, etc.), **$5,000,000.**

★ **†New Mexico**—Bureau Reclamation, In
terior Bldg., 19 and C Sts. N.W., Wash
25, D. C., under study diversion dam, canal
Hammond Proj., San Juan River, **$725,**
Fort Sumner Proj., Pecos River, **$615,**
3 earth dams, drains Middle Rio Grand
Valley Proj., Rio Grande River, **$16,000,**
canals, Springer Proj., Canadian Rive



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POSTWAR PROJECTS (Cont'd.)

$800,000; dam enlargement, Alamogo Proj., Pecos River, **$1,270,000;** earth da canals, Mora Proj., Mora River, **$2,500,** miscellaneous projects, **$1,000,000;** ea dam, power plants, canals San Juan-Cha Diversion Proj., San Juan River, **$15,90** concrete dam, power plant, Cliff Reserv Proj., Gila River, **$9,500,000.**

★ **†Oklahoma** — Bureau Reclamation, terior Bldg., 19 and C Sts. N.W., Wa 25, D. C., under study canals, Fort Sup Proj., North Canadian River, **$234,000;** C ton Proj., North Canadian River, **$1,700,** earth dam canals, Englewood Proj., Cim ron River, **$5,900,000;** miscellaneous projec **$1,000,000;** Kenton Proj., Cimarron Riv **$3,900,000;** Fort Cobb Proj., **$2,400,** Barnitz Proj., **$2,500,000;** Foss Pr **$6,500,000;** earth dam, Rainey Mount Reservoir Proj., **$2,400,000,** all foregoi Washita River.

★ **†Okla., Bartlesville**—U. S. Eng., 231 Main St., Denison, Tex.. Hulah Dam flo control project near Arkansas River. **850,000.**

★ **†Oregon**—Bureau Reclamation, Inter Bldg., 19 and C Sts. N.W., Wash., D. C., under study canals, pump. pla Canby Proj., Molalla River, **$290,000;** 3 ear dams, canals, drains, Grande Ronde Pr Grande Ronde River, **$13,115,000;** earth da canals, pumps, Crooked River (Ochoc Proj., Crooked River, **$1,680,000;** earth da canals, Yamhill Proj., Yamhill Riv **$7,200,000;** Illinois Valley Proj., Illin River, **$5,300,000;** Merlin Proj., Rogue Riv **$2,904,000;** Bully Creek Reservoir Proj., Ma heur River, **$1,217,000;** Talent Proj., Be Creek, **$2,342,000;** Wapinitia, Paulina a miscellaneous projects, **$2,500,000;** earth da canals, power plant Debenger Gap Pr Rogue River, **$13,740,000;** Baker Pr Powder River, **$3,663,000.**

★ **†Texas** — Bureau Reclamation, Inter Bldg., 19 and C Sts. N.W., Wash., D. C., under study earth dam, canals Sabi Proj., Sabinal River, **$1,725,000.**

★ **†Utah** — Bureau Reclamation, Inter Bldg., 19 and C Sts. N.W., Wash., D. C., under study earth dam, tunnel, can Hurricane Proj., Virgin River, **$8,400,** Gooseberry Proj., Prince River, **$1,400,** earth dam, canals, pumps, Ogden Riv Exten. Proj., Ogden River, **$3,000,000;** pum plant, wells, canals Weber Delta Pro Weber River, **$927,000;** earth dam, cana Vernal Proj., Ashley Creek, **$1,600,** Ouray Valley and miscellaneous projec **$5,000,000;** Santa Clara Proj., Santa Cla Creek, **$1,500,000;** Emery Co. Proj., Cotto wood Creek, **$3,715,000;** concrete dam, pow plant, Uintah-Echo Park Unit Proj., Gre River, **$46,000,000;** earth dikes, canals, M nila Proj., Henrys Fork, **$1,462,000;** co crete dam, tunnels, canals, Farmingt Proj., Weber River, **$2,200,000;** concrete da pumps, canals, Cutler Proj., Bear Rive **$5,000,000;** earth dam, power plant, Dew Reservoir Proj., Colorado River, **$41,000,** earth dam, canals Moon Lake Exten. Pro Duchesne River, **$4,500,000;** Woodruff Pro Bear River, **$3,000,000;** concrete dam Bl Proj., San Juan River, **$16,000,000.**

★ **†Washington**—Bureau Reclamation, Inte ior Bldg., 19 and C Sts. N.W., Wash., D. C., under study earth dams, canals, Bu bank and miscellaneous projects, Columb River, **$2,450,000;** concrete dam, power pla Foster Creek Project, Columbia River, **$7** **500,000;** canals, pumps, drainage, Gre Puyallup-Auburn Unit Project, Green Rive **$2.500,000.**

★ **†Wyoming**—Bureau Reclamation, Interi Bldg., 19 and C Sts. N.W., Wash., D. C., authorized canals Kendrick Pro North Platte River, **$1,584,000;** under stu earth dam, canals, La Barge, Fontenell Shell Creek, miscellaneous projects, **$2,50** **000;** Evanston Proj., Bear River, **$2,000,** Pinedale, Kendall Reservoir Proj., Gree River, **$10,081,000;** Lyman Proj., Smith Fork, **$2,363,000;** concrete dam, power plan Kortes Proj., North Platte River, **$7,045,** earth dam, Little Snake River Proj., Litt Snake River, **$310,000;** Stump Creek Pro Stump Creek, **$550,000;** diversion dam, cana Seedskadis Proj., Green River **$4,543,000.**

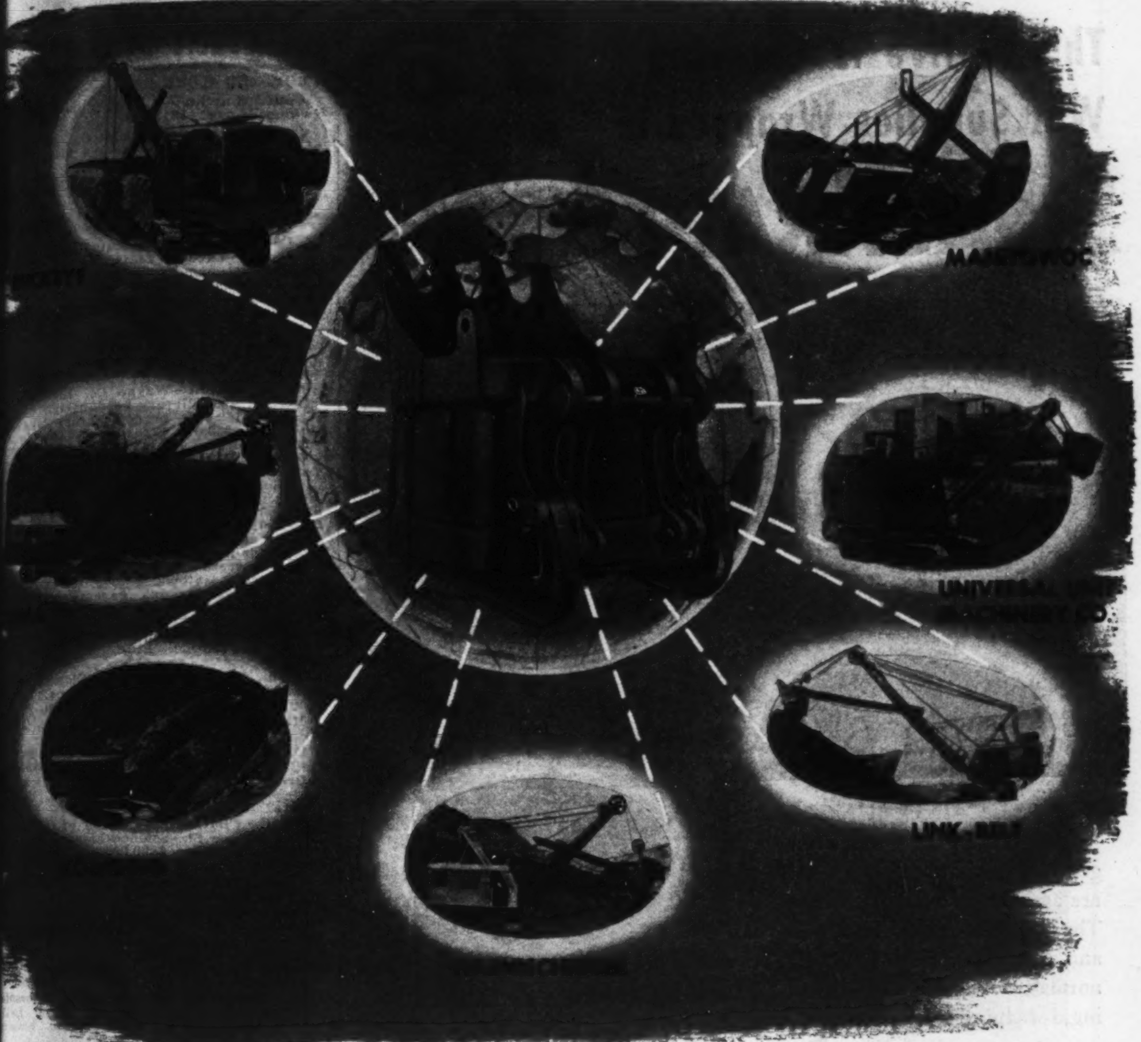
Ont., Timmins—Municipality, A. L. Sha clk., reclaiming river banks. **$50,000.** J. MacLean, Town Hall, engr.

PLANS UNDERWAY

★ **Mich., Trenton**—Wayne Co. Port Detr Comn., 2333 Barlum Tower, Detroit, In dustrial District Channel along waterfro of Detroit River south of Trenton Chann providing water transportation to and fro Industrial plants, **$700,000;** dredged chann from Brownstown Twp. to Lake Erie, crea ing addnl. industrial sites and providin shorter water route to Lake Erie and throug water traffic in Detroit River west of Gros Ille, **$3,800,000.** W. C. Cowling, 2333 Bar lum Tower, Detroit, engr.

★ **Tex., Corpus Christi**—U. S. Eng., 25 S and Avenue F, Galveston, plans 15 completed boat and barge channel betwe here and Port Isabel. **$5,000,000.**

★ **Tex., Raymondville**—Willacy Co., Ray mondville, plans 10% completed, 400x6 ft. deep water Port Basin, **$1,000,000;** con structing connecting channel on Corp Christi-Port Isabel Intercoastal Channe **$1,000,000.** Purefoy & Patterson, Kingsvill consult. engrs.



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PUBLIC BUILDINGS

PROPOSED WORK

Calif., Eureka — City. gymnasium an swimming pool. **$212,000.**

Calif., Eureka—Humboldt Co., county ha of records, **$300,000**; veterans bldg. $20,0 school, **$6,000**, site acquired.

Calif., Placerville—Eldorado Co., hospita **$200,000.**

★ **Calif., Sacramento**—City. hall of justic and health center. **$650,000-$750,000.**

★ **Conn., Bridgeport**—State. Brig. Gen. B. De Lacour, State House, Hartford brick, steel armory, incl. training ground and community athletic facilities, $500,0 Land rights not cleared, financing not ye provided for.

Ill., DuQuoin—DuQuoin High School Bd. 100, E. E. Thornton, secy., 2 story, bsmnt. brick school bldg., on site next to presen high school athletic field. **$150,000-$200,0**

Mich., Detroit—Wayne Co. Library, 366 Trumbull Ave., library headquarters bldg. a Wayne, **$150,000**; branch library bldgs., a Plymouth **$30,000**, Trenton **$30,000**, Inkste **$20,000**. Allen Park **$20,000**, Belleville $20, 000. Flat Rock **$30,000**, Melvindale $20,0 Garden City **$20,888**, Redford Twp. $20,000.

★ **Mich., Eloise**—Wayne Co. Infirmary Eloise, bakery and storage bldg **$200,000**; 4 story, bsmnt. employees bldg **$650,000**; brick, steel concrete Bldg. N addn., psychopathic section, $1,150,000; story laundry bldg., **$200,000**; 2 story, brick steel, concrete main shops, $100,000; voca tional and maintenance shop, $125,000; powe house, boilers, pumps, generators, $500,0 Bldg. G replacement, $900,000; 3 story bsmnt. Bldg. F replacement, $545,000; story, bsmnt. women's infirmary. $900,0 3 story, bsmnt. Bldg. E replacement **$900,000.**

Mich., Eloise—Wayne Co., Eloise Hospita brick, steel, concrete occupational therap bldg., for hospital group. **$422,000.**

Mich., Mt. Clemens—Macomb Co., Count Bldg., jail. **$250,000.**

Minn., Luverne—Bd. Educ., M. C. Munson supt., high school gymnasium. $150,000.

Ore., Portland—Pub. Bldgs. Admin., 1 and F Sts. N.W., Wash., 25, D. C., 20 stor federal office bldg.

★ **S. C., Charleston**—College of Charleston 66 George St., science bldg., library and dormitory. Over **$500,000**. Financing no yet provided for, land rights not cleared.

Wash., Tacoma—Pierce Co., Court Hous hospital alterations. **$150,000.**

Alta., Medicine Hat—Municipality. F Blackburn, city clk., recreational centr $250,000.

N. S., Halifax—Halifax School Bd., J Myrden, chn., Roman Catholic High School Windsor St. and Quinpool Rd. $250,000.

Ont., New Toronto (Postal District Toronto —Municipality, technical school for Lakeshore District east of Ontario hospita grounds, **$150,000.**

Ont., Toronto—Municipality, central police bldg. with office space and adequate cell accommodating prisoners on remand, replacing present Police Station 2 on Dunda St. and Police Station 4 on Parliament St **$350,000.**

★ **Ont., Waterloo**—Municipality, hospital fo incurables and county court house addn. **$1,000,000.**

PLANS UNDERWAY

★ **Calif., Santa Barbara**—Santa Barbara State College, Mission Ridge, plans by W. Soule, 116 E. Sola St., classroom bldg., **$149,800**; Physical Education bldg., $273,0 Home Economics bldg., **$149,000**; Psycholog & Education bldg., **$135,000**; library **$252,000**; Administration bldg., **$90,000**; auditorium, **$315,000**; utilities and grounds **$140,000**, all at La Mesa Campus.

★ **Conn., East Hartford**—Town Bd. Educ. Town Hall, plans by Tooker & Marsh 101 Park Ave., New York, N. Y., brick steel, stone high school, **$1,500,000**; brick steel school, **$152,000**; 2 story, bsmnt., brick steel Woodland School addn., alteration **$175,000**; brick, steel South End School **$250,000**. CD 1/21—ENR 2/10.

★ **Conn., Rocky Hill**—State, Veterans Home Bldg. Com., West St., Rocky Hill, preliminary plans underway by D. Orr, 966 Grove St., New Haven, Veterans' Home incl. hospital and nurses' home addns., 2 barracks, staff and utility bldgs., etc **$1,400,000.**

Conn., Stamford—Town, L. C. Staples, supt Schools, 59 Prospect St., plans 75% completed by F. L. S. Mayers, 2 West 47 St., New York, N. Y., brick, steel Junior High School, Hope St. **$175,000.**

★ **Ga., Atlanta**—Georgia School of Technology, 225 North Ave. N.W., plans by R. L. Aeck, c/o owner, administration and classroom bldg., library and connecting museum and colonade, **$850,000.**

★ **Ill. Springfield** — State, preliminary sketches by C. Herrick, Hammond, state archt. Armory Bldg., Springfield, 3 story concrete state museum on block bounded by First, Monroe, Spring and Adams Sts

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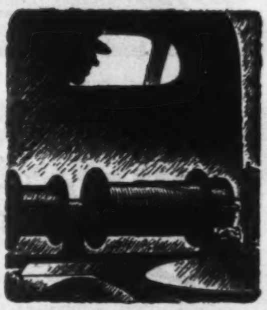

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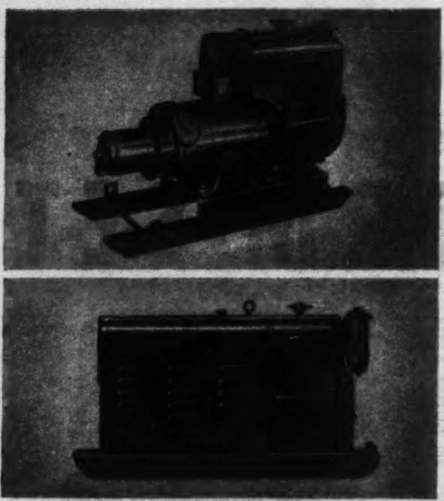

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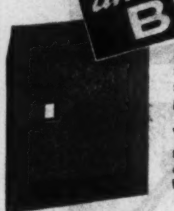

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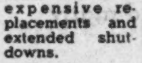

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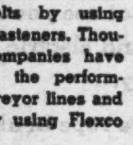

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POSTWAR PROJECTS (Cont'd.)
$2,050,000. Land rights not cleared, finan
ing not yet provided for.

★**Ind., Anderson**—City, G. M. Rogers, pr
School Bd., A. Chadd, supt. School
Forest Manor, plans by E. F. Miller, Ande
son Bank Bldg., school, 7 and Delawa
Sts., **$160,000**; Central Junior High Scho
on recently purchased grounds W. 13 a
Morton Sts., **$300,000**; South Side Juni
High School, 29 and Jackson Sts. $250,0
CD 3/31/43—ENR 9/2/43.

★**Ind., Hammond**—Bd. School Truste
C. C. Sohl, chn., 6935 Hohman St., pr
liminary plans by L. Crosby Bernard, 12
Forest Ave., technical high school, $600,
L. Besozzi, 314 Hammond Bldg., mech. eng

★**Ind., Kokomo**—Trustees School Bd., C.
Haworth, supt. Schools, plans underw
by McGuire & Shook, 1400-01 Fletcher Tr
Bldg., Indianapolis, 1 story, part bsmn
balcony, brick, stone rein.-con., structur
steel field house for athletics, **$650,000.** F
nancing not yet provided for.

Kan., Holton—City, J. B. Bennett, mayo
preliminary plans municipal power plan
$100,000. Black & Veatch, 1706 Bway
Kansas City, Mo., consult. engrs.

★**La., New Orleans**—City, plans by W
R. Burk, Associated Architects & Eng
neers, Pan American Bldg., 4 story, bsmn
mental hospital, **$300,000**; 200-bed capaci
tuberculosis hospital, St. Louis and N. Ram
part Sts., **$200,000.**

★**Mich., Detroit**—Wayne Co., Port of D
troit Comn., 2333 Barlum Tower, termin
warehouse housing incoming and outgoi
less-than-carload freight shipments. $1,00
000. W. C. Cowling, 2333 Barlum Towe
engr.

★**Mich., Ecorse**—Wayne Co. Port of D
troit Comn., 2333 Barlum Tower, Detro
port terminal in downriver sect. Detro
River for transfer of ocean borne bulk com
modities to trunkline railroads. $2,800,0
W. C. Cowling, 2333 Barlum Tower, Detro
engr.

Mich., Grand Rapids—Bd. Educ., 143 Bos
wick St. N.E., plans underway by R. Alle
1029 Grand Rapids National Bank Bld
brick, steel, stone, rein.-con. Junior Hig
School, **$175,000.**

Mich., Grand Rapids—Michigan Soldier
Home, 3000 Monroe St. N W., plans unde
way by R. Allen, 1029 Grand Rapids Nation
Bank Bldg., brick, concrete domicilia
$270,000.

Mich., Lansing—Bd. Educ., Lansing, pla
by Herrick & Simpson, 1005 Bauch Bld
brick, steel, concrete, stone school. $375,0

Neb., Falls City—G. S. Lyon, mayor, Ci
Hall, power plant, **$50,000.** R. Fulton, 22
S. 19 St., Lincoln, consult. engr.

N. C., Raleigh—State College of Agricu
ture and Engineering of the University
North Carolina, Raleigh, sketches by
Shumaker, c/o owner, mechanical enginee
ing bldg., engineering laboratory, structu
to house engineering experiment statio
Over **$300,000.**

★**Ore., Salem**—State Bd. Control, Sale
plans underway by Whitehouse, Churc
Newberry & Roehr, Railway Exchange Bld
Portland, office bldg. **$1,000,000.** CD 2/10/
—ENR 3/4/43.

Tenn., Memphis—City, J. B. Boyle, com
Police Station Headquarters, 2 and Adam
Sts., plans completed by G. Mahan, Jr., Ste
rick Bldg., remodeling central police st
tion, **$150,000.** Financing not yet provide
for. CD 2/10—ENR 2/24.

★**Tex., Dallas**—City, plans by H. Barthol
mew & Associates, 317 N. 11 St., S
Louis, Mo., and S. S. Hare, (master planner
Sophian Plaza, Kansas City, Mo., Senior Hig
School, Beckley and Saner Sts., $350,0
Junior High School, near Adamson Hig
School. **$400,000**; Junior High School, ne
Forest Ave. High School, **$400,000**; hig
school north of Hines Blvd. and west
Cotton Belt Ry., **$450,000**; Junior Hig
School, north of Hines Ave. and west
Cotton Belt Ry., **$350,000.**

Vt., Randolph—Town School Comn., Ra
dolph, plans by Hudson & Ingram, 9 Bu
St., Hanover, N. H., high school add
Over **$150,000.**

Wis., Juneau—Dodge Co., W. Oberdie
clk., preliminary plans by Foeller, Schobe
Berner, Safford & Jahn, 310 Pine St., Gre
Bay, home for poor. **$185,000.** CD 2/17
ENR 3/9.

Ont. Peterborough—Municipality, electr
sub-station, rebuilding parts of distr. sy
$50,000. Utilities Comn., R. L. Dobbin, mg
223 Aylmer St., engr.

Ont., Port Arthur — Municipality, com
munity center. **$200,000.** S. E. Flook, Ci
Hall, engr.

Ont., Timmins—Municipality, A. L. Sha
clk., fire hall and warehouse for machine
$150,000. J. D. MacLean, Town Hall, eng

★**Ont., Toronto**—Municipality, plans
A. S. Mathers, 96 W. Bloor St., Ma
Hall on scale of miniature Radio Ci
$500,000.

Que., Quebec City—Municipality, heal
centre bldg., **$150,000**; workshop and oth
public works department bldgs., on Ha
Pointe property. **$150,000.** E. Hamel, Ci
Hall, city engr.

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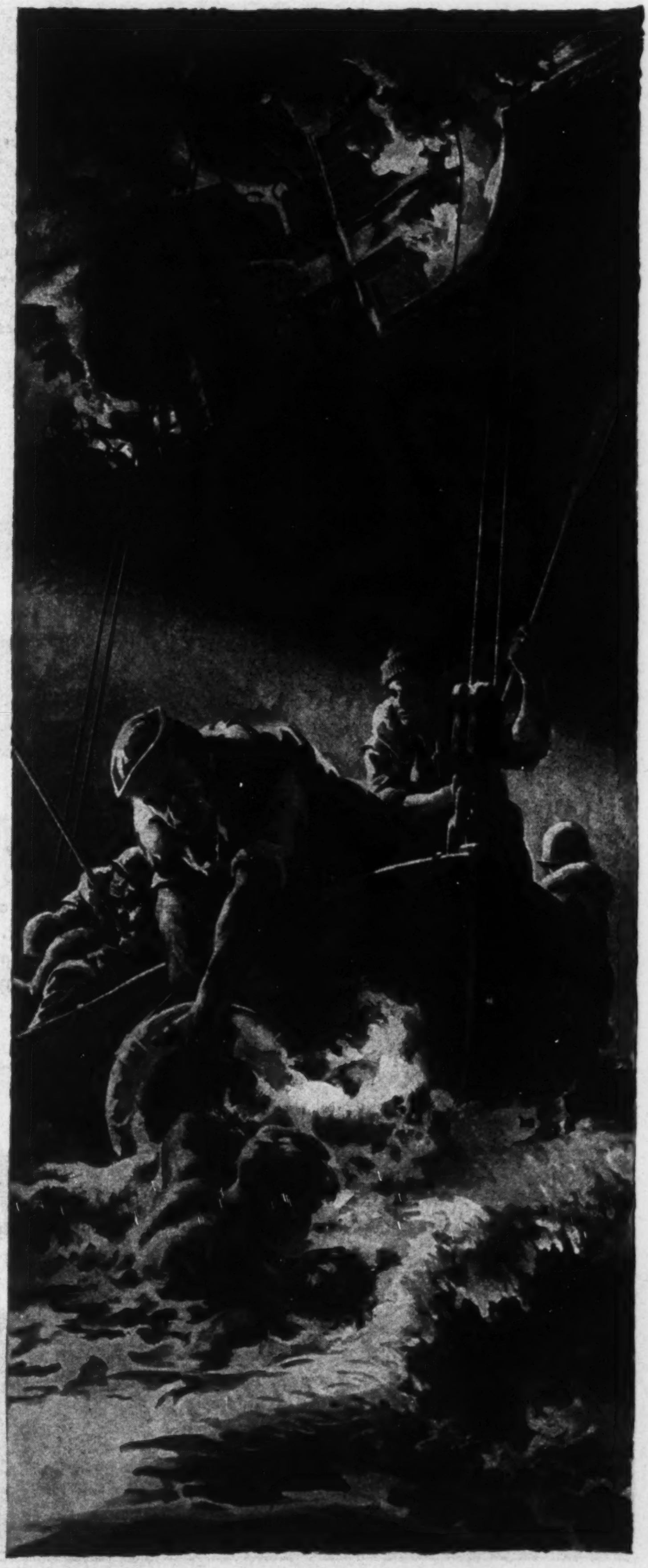

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POSTWAR PROJECTS (Cont'd.)

Que., Quebec City—Municipality, firepr
ing, exten. civic hospital, $200,000. E. Ha
City Hall, city engr.

Sask., Saskatoon — Municipality, ex
nurses' residence, City Hospital, $200,0
electrical substation, $40,000. G. E. Ar
bald, City Hall, acting city engr. CD 1/1
ENR 1/27.

COMMERCIAL BUILDINGS

PROPOSED WORK

Ill., Decatur—The James Milliken U
versity, 1200 Block West Main St., modif
Elizabethan style architecture dormito
$150,000-$200,000, and science bldg., $250,0
both 3 story, brick, concrete fdn.

★**Ill., Mt. Vernon**—Sisters of St. Fran
Good Samaritan Hospital, 605 N. 12
brick hospital, cement fdn., adjoining pr
ent hospital. $500,000.

Mich., Detroit—Woman's Hospital, 432
Hancock Ave., brick, steel, rein.-con. hos
tal addn. $300,000.

Miss., Holly Springs—Rust College, Dr.
D. Redmond, pres., Holly Springs, rais
funds, administration bldg. $300,000.

Mo., St. Louis—Francis H. Kennedy, et
Hiemenz Real Estate Co., 714 Chestnut
Zone 1, housing on site fronting 535 ft.
5200 blocks of South Broadway, $200,
Site purchased.

★**N. Y., New York**—Wm. Barken &
Greenberg, 639 West End Ave., Zone
apartment, Bway. and 96 St. Over $500,

N. Y., New York—Cannon Constr. Co
521 Fifth Ave., Zone 17, apartment,
100x161 ft. plot, at 136-148 7 Ave., southw
corner 19 St. Over $150,000.

★**N. Y., New York**—W. B. Chrysler B
Corp., Chrysler Bldg., Zone 17, o
bldg., on 100x200 ft. plot, 43 St. and Th
Ave. Over $1,000,000.

N. Y., New York—Syndicate, c/o I. Br
sky, 570 7 Ave., Zone 18, 6 story apartm
on 100x175 ft. site, 322-334 E. 63 St. O
$150,000.

O., Shaker Heights—Cleveland Cath
Diocese, c/o Bishop E. F. Hoban, N.B
Bldg., Cleveland, convent and acade
$300,000. Land rights not cleared and fina
ing not yet provided for.

Pa., Bradford—Dresser Mfg. Co., Br
ford, 3 story, bsmnt., brick, steel, concr
office bldg. $150,000.

★**Pa., Chester** — Bd. Directors Che
Young Men's Christian Assn., YM
Bldg., 2 community bldgs. $675,000.

Pa., Overbrook—Friends Central Sch
68 St. and City Line, field house. $150,
Funds available.

★**Tenn., Nashville**—J. Cheek, 8 Ave.
Commerce St., hotel, $600,000-$700,00

Tex., Dallas—Bradford Memorial Hospit
3512 Maple St., nurses home. $150,000.

Tex., Houston—Adath Emeth Congregat
c/o Rabbi M. Landman, 607 White St., sch
$150,000.

Tex., Houston—Memorial Hospital,
Lamar St., 5 story, rein.-con., brick st
nurses training school, dormitory, $250,

★**Tex., San Antonio**—Interstate Circ
Inc., Majestic Bldg., theatres, Nogali
and Linares Sts., $150,000; on N. Zarzam
St., $150,000; on Fredericksburg Rd. a
Santa Barba St., $150,000; on San Pedro a
Hildebrand Ave., $150,000; theatre, locati
not yet selected. $150,000.

Wash., Tacoma—Fisher Co., 1104 Bwa
department store imprvs. $300,000.

PLANS UNDERWAY

Calif., Altadena—Westmont College,
S. Westmoreland Ave., Los Angeles, pla
by G. Stanley Wilson, 3681 6 St., Riversi
dormitory, science bldg., library, art bld
gymnasium and chapel accommodating 1,
students. $400,000. Site purchased.

Calif., Long Beach—R. E. Campbell,
E. Weber Ave., Compton, plans underw
by T. Criley, Jr., 607 Architects Bldg., L
Angeles, 5 story, bsmnt. garage adds.
Lafayette Hotel, $200,000.

★**Calif., Oakland**—Kahn's Departm
Store, 1501 Bway., plans underway
W. G. Corlett & A. W. Anderson, Bank
America Bldg., 4 story, rein.-con., str
tural steel department store bldg. add
alterations, incl. increased 100 ft. Bw
frontage, $1,000,000.

★**Calif., Pasadena**—Bullocks, Inc., 7
Bway., Los Angeles, plans underway
Wurdeman & Becket, 6535 Sunset Bl
Hollywood, 3 story Class A department st
on 380x960x967 ft. site, Dell Mar St., H
son and Lake Aves. $2,000,000. CD 7/1
ENR 7/27.

★**Calif., San Francisco**—Owner, c/o J.
Bolles & J. Francis Ward, archts.,
Market St., prepared preliminary plans
structures wearing apparel center. $4,000,

★**Colo., Longmont**—St. Colletta School,
3, Jefferson, Wis., plans nearing c
pletion by E. Brielmaier & Sons Co., 725
Water St., Milwaukee, Wis., home for
ceptional children, administration and sch
bldg., 8 cottages, central heating pla
elevator. $500,000-$600,000. CD 12/1
ENR 12/16.

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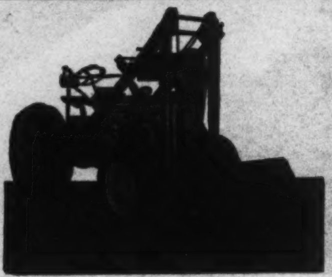

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POLES, CROSS ARMS, PILING, TIES
POSTS, BRIDGE AND DOCK TIMBERS
TREATING PLANTS
Jacksonville, Fla. Norfolk, Va.
Long Island City, N. Y.

POSTWAR PROJECTS (Cont'd.)

Conn., Stratford—A. M. Picks, Strat
Theater, 2422 Main St., plans by O. C
Ziroli, 115 Wall St., Bridgeport, bri
limestone theater, 2 wings for small st
and park landscaping, equipped for te
vision, circular driveway. **$150,000.**

Conn., Stratford—St. James RC Par
J. H. Anderson, pastor, 2110 Main St., pl
by G. J. Phelan, 211 State St., Bridgepo
2 story, bsmnt., school and altering
residence for convent. **$150,000.**

★**Ill., Evanston**—Washington National
surance Co., H. R. Kendall, chn.
610 Church St., Evanston, plans comple
by Graham, Anderson, Probst & White,
E. Jackson St., Chicago, 7 story, brick, sto
steel office bldg., on Chicago Ave. betw
Church and Davis Sts., and connecting
story main office bldg., at 610 Church
and 7 story annex on rear of proper
$1,000,000.

Ind., Indianapolis—Roman Catholic D
cese, Bishop J. Ritter, 14 and Meridian S
plans by D. A. Bohlen & Son, 1001 Fa
Bureau Bldg., church and school, 38
between Orchard and Forest Manor Av
$300,000. Land rights not cleared.

Ia., Estherville — Sisters of Sorrow
Mothers, 6718 Cedarburg Rd., Milwauk
Wis., sketches by E. Brielmaier & Sons C
735 N. Water St., Milwaukee, 2, Wis., 50-
bed addn. to Holy Family Hospital.

La., Alexandria—Baptist Hospital, Ale
andria, plans 5% completed by Ed. F. Nei
City Bank Bldg., Shreveport, hospital
pansion. Over **$150,000.**

★**N. Y., New York**—Ashley Apartme
Inc., P. Sinnott, Jr., pres., 621 Tiff
St., Zone 59, plans completed by H. Lil
2095 Bway., Zone 23, 10 story, 115 x 142
brick, apartment Grand Concourse and
St. **$750,000.**

★**N. Y., New York**—Emigrant Industr
Savings Bank, 51 Chambers St., Zone
plans completed by Boak & Raad, 175 Fi
Ave., Zone 10, plans completed apartme
Madison Ave. and 89 St. **$1,000,000.**

★**N. Y., New York**—Emigant Industr
Savings Bank, 51 Chambers St., Zone
plans completed by Harrison Fouilhoux
Abramowitz, 45 Rockefeller Plaza, Zone
23 story, office and mfg. bldg., southe
blockfront Nassau St. from Beekman St.
Theatre Alley. **$2,000,000.**

★**N. Y., New York**—515 Seventh Ave. Co
D. A. Harris, pres., 1359 Bway., Zone
plans completed by Ely Jacques Kahn
Robert Allan Jacobs, 2 Park Ave., Zone
32 story, 98x200 ft. bldg. containing offic
showrooms, stores and mfg. space, 513-
Seventh Ave. **$3,000,000.**

★**N. Y., New York**—53rd Organizing Co
c/o I. J. Berger, archt., 44 E. 53
Zone 22, plans completed 15 story office a
showroom bldg., 44-56 E. 53 St. **$750,000.**

★**N. Y., New York**—Fred F. French
vesting Co., 551 Fifth Ave., Zone
plans completed by W. I. Hohauser, 1
Bway., Zone 23, 12 story, 131x241 ft., apa
ment bldg., E. 41 St. and Prospect
$800,000. V. Mayper, 110 W. 40 St., Zo
18, consult. engr.

★**N. Y., New York**—C. J. & M. Ginsbe
80 Broad St., Zone 4, plans comple
by S. Bien, 9 E. 46 St., Zone 17, 30 st
apartment house, on 167x175 ft. site, 880-
Fifth Ave., corner 69 St. **$1,750,000.**

★**N. Y., New York**—Guaranty Trust
of N. Y., 140 Bway., Zone 7, plans co
pleted by H. P. Jaenike, 23 W. 47 St., Zo
19, 19 story, penthouse apartment, 856 Fi
Ave., **$2,013,000;** 19 story penthouse, 30x
ft. apartment, 828 Fifth Ave., **$360,000;**
story, penthouse apartment, 4-8 E. 64
$240,000.

★**N. Y., New York**—Industrial Equiti
Inc., 385 Madison Ave., Zone 17, pl
completed by J. Martine, 15 E. 40 St., Zo
16, 17 story loft bldg., 325-37 E. 45
$1,000,000.

N. Y., New York—Jobreen Realty Co
c/o H. I. Feldman, archt., 415 Lexing
Ave., Zone 17, plans completed 6 story apa
ment, 180 W. Houston St. **$175,000.**

★**N. Y., New York**—Revenue Realty Co
E. H. Zogat, pres., 1819 Bway., Zone
plans completed by H. I. Feldman,
Lexington Ave., Zone 17, 19 story, pentho
apartment, 128-130 Lexington Ave. **$1,0
000.**

★**N. Y., New York**—Seaman's Bank
Savings, 74 Wall St., Zone 5, plans co
pleted by E. J. Hurley, c/o owner, 19 sto
penthouse apartment, 71 Riverside D
corner W. 79 St. **$850,000.**

★**N. Y., New York**—720 Third Ave. Co
L. Dowdney, pres., 285 Madison A
Zone 17, plans completed by S. S. Goldsto
285 Madison Ave., Zone 17, 35 story comm
cial bldg., 720-24 Third Ave. **$2,250,000.**

N. Y., New York—Shapwise Realty Co
c/o DeYoung, Moscowitz & Rosenbe
archts., 205 E. 42 St., Zone 17, plans co
pleted 12 story, penthouse apartment,
W. 54 St. **$300,000.**

N. Y., New York—Sheldon Estates, I
c/o H. Herbert Lilien, archt., 215 E
St., Zone 51, plans completed 10 story apa
ment, 51 W. 92 St. **$450,000.**

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DESPITE cold and wet weather, construction and maintenance work must go on.

Cleaver-Brooks equipment provides steam, heat or hot water — fast, efficiently and at low cost — for a wide range of cold weather needs, such as—

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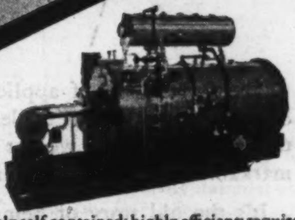

Completely self contained; highly efficient; require only simple piping connections to place in operation. Fully automatic fuel-oil burner; condensate recovery and feed water pumping system; no stack needed, sizes ranging from 20 to 500 h. p.; pressures 15 to 200 lbs.

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Oil-fired; fully automatic or manual operation; no licensed engineer needed to operate; two capacity sizes: 3000 gals. storage tank providing 1600 gals. of water heated 150° F. per hour; 1500 gals. storage tank providing 800 gals. of water heated 150° F. per hour.

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Heats bituminous material by direct firing in one operation, loading directly to distributor, relay truck or returning to tank car. Built in two sizes, truck mounting or 4-wheel trailer.

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POSTWAR PROJECTS (Cont'd.)

N. Y., New York—3535 Park Ave. C
P. Schupak, pres., 370 Ft. Washington A
Zone 33, plans completed by H. I. Feld
415 Lexington Ave., Zone 17, 6 story ap
ment house. 1661-81 St. Nicholas Ave., c
ner Fairview Ave. $450,000.

★**N. Y., New York**—Timken Realty Co
W. R. Timken, pres., 597 Madison A
Zone 22, plans completed by Ely Jac
Kahn & Robert Allan Jacobs, 2 Park
Zone 16, altering 17 story bldg., 501-
7 Ave. $700,000.

N. Y., Rego Park—F. R. Bridlie, c/o
Rothstein & Sons, archts., 391 Fulton
Brooklyn, Zone 1, plans completed 6 st
100x110 ft., apartment, 82 Rd. and Qu
Blvd. $187,000.

N. Y., Rego Park—S. Leider, c/o M. Ro
stein & Sons, archts., 391 Fulton St., Bro
lyn, Zone 1, plans completed 110x220
apartment, 67 Rd., north of Austin
$450,000.

N. Y., Rego Park—E. Minskoff &
Abramson, c/o S. Bien, archt., 9 E. 46
New York, Zone 17, plans completed 87x
ft. apartment, 75 Rd. and Queens Bl
$180,000.

N. Y., Rego Park—M. Minskoff, c/o S. B
archt., 9 E. 46 St., New York, Zone 17, pl
completed 6 story, 100x170 ft. apartme
67 Drive and Booth St. $180,000.

N. Y., Rego Park—Saunders Park Esta
c/o H. I. Feldman, archt., 415 Lexing
Ave., New York, Zone 17, plans comple
6 story, 130x200 ft. apartment, 64 Rd. fr
Queens Blvd. to Saunders St. $350,000.

Tex., Brownsville—The Mexico Theat
Brownsville, plans 25% completed remod
ing 1 and 2 story theatre. $150,000.

Tex., Houston—Gaspar M. DeGeor
Estate, c/o A. Lamantian, Ambassador
tel, 919 Fanin St., plans 50% completed c
verting existing 7 story hotel and apa
ment bldg., into 64 efficiency apartmen
$450,000.

★**Tex., San Antonio**—Interstate Circ
Inc., Majestic Theatre Bldg., plans
derway 5 neighborhood theatres. $150,
each.

Tex., San Antonio—E. h. McKemie,
tional Bank Commerce Bldg., plans
H. P. Smith, National Bank of Comme
Bldg., permanent type tourist courts. O
$150,000.

Wis., West Allis—Carmelite Sisters, 2
S. 52 St., Zone 14, plans by E. Breilmaier
Sons Co., 735 N. Water St., Milwaukee, Z
2, 3 story, bsmnt. children's home addn.

Man., Brandon—Canadian National R
H. A. Dixon, ch. engr., 360 McGill
Montreal, Que., enlargement Prince Edwa
Hotel. $150,000.

★**Que., Quebec City**—Canadian Pacific
Co., J. E. Armstrong, ch. engr., Wind
Station, Montreal, 600 room hotel ann
swimming pool, convention and banquet h
to Chateau Frontenac Hotel, $2,000,000.

CONTRACTS AWARDED

Calif., Los Angeles—Farmers Automob
Inter-Insurance Exchange, 4680 Wilsh
Blvd., add 3 rein.-con. stories to exist
bldg., to Wm. Simpson Constr. Co., Arc
tects Bldg., $300,000. Claude Beelman, 1
Union Bank Bldg., archt.

Mo., Overland (br. St. Louis)—Schrad
Building & Realty Co., R. J. Schrader, pr
6651 Enright Ave., St. Louis, Zone 5,
bungalows on 45 acres tract beyond here,
St. Louis Co. Owner builds. $250,000 p
Site obtained.

INDUSTRIAL BUILDINGS

PROPOSED WORK

Mo., Doniphan—PLANT—Wright Leat
Specialty Co., c/o Denver M. Wright,
Manchester Ave., Maplewood, St. Lo
Zone 17, 2 story, bsmnt., brick leather go
mfg. plant. $75,000, incl. equip.

★**N. Y., Syracuse**—PLANT—General E
tric Co., River Rd., Schenectady, m
plant, incl. administration bldg., resea
laboratory, assembly shops, for Electron
Dpt. on 150 acre plot. Over $1,000,000.

N. C. Charlotte—STORAGE—Carey Tra
fer & Transportation Co., H. D. Albrig
mgr., Charlotte, storage bldg., West Pal
St. Over $40,000.

Pa., Easton—PLANT—Mack Printing
c/o C. S. Fleck, Easton, plant addn. $200,

Tex., Galveston—PLANT—Central Da
Products Co., 1st National Bldg., Oklaho
City, Okla., ice cream mfg. plant. O
$50,000.

Wash., Tacoma—BOTTLING PLAN
Coca Cola Bottling Co., 2360 Fawcett
bottling plant. $300,000.

★**Wash., Tacoma**—MILL, etc.—St. Re
Paper Co., Tide Flats, Tacoma, pa
mill and bag plant. $3,000,000.

Wyo., Cheyenne—PLANT—Frontier Re
ing Co., Cheyenne, converting existing 1
octane plant into black oil mfg. unit, o
$250,000; large steel tank storage farm
black oil and asphalt.

Alta., Lethbridge—BAKERY, etc.—E
son Milling & Elevator Co., Ltd., Lethbrid
bakery and 4 modern residences. $65,

7 YEARS WITHOUT A BREAKDOWN OR MACHINE REPAIR

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George W. Brown,
wn Superintendent,
lworth, New York.

ar Mr. Brown:

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It is gratifying to note that you have yet to buy your first actual repair parts for your General Excavator, particularly since this machine was shipped more than 7 years ago. Most folks would expect that a machine of that age, and with the service it has given, would be pretty well worn out — or would have required thousands of dollars in repair expenditures.

In all modesty, Mr. Brown, we do take pride in the way Generals can "dish it out" and "take it," and here's hoping you continue to have the best of luck with your machine. Here too, incidentally, is our promise that after the war, Generals will be better than ever!

Cordially,

THE GENERAL EXCAVATOR COMPANY,

Don B. Smith, Sales Manager

DBS/fb

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Walworth, N. Y.

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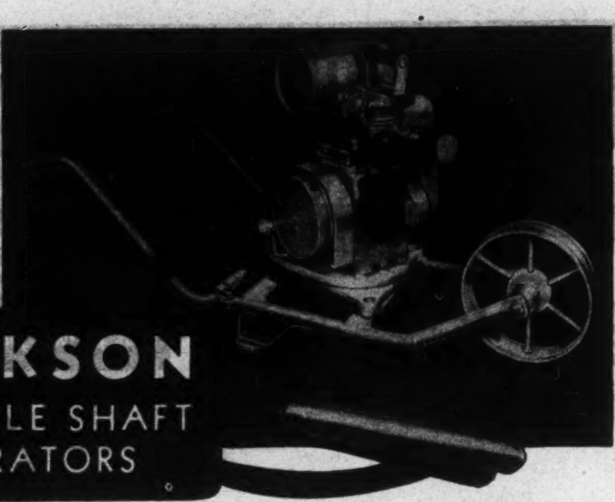

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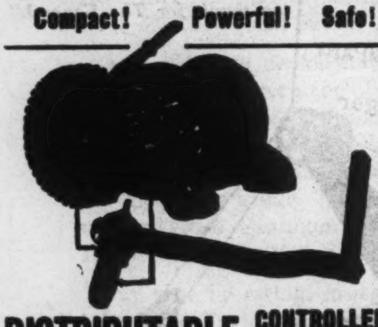

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COMPRESSORS
DE LAVAL IMO OIL PUMPS

De Laval STEAM TURBINE CO

POSTWAR PROJECTS (Cont'd.)

Alta, New Dayton—STORAGE ANNE Ellison Milling & Elevator Co., Ltd., Le bridge, permanent grain storage an **$40,000.**

B. C., Vancouver—FACTORY—Bartle Gibson Co., Ltd., c/o Robertson, Douglas Symes, 640 W. Pender St., factory. **$**

Ontario—PLANT—Marathon Paper Mills Canada, Ltd., Rochschild, Wis., U. S plant.

Ont., London—FACTORY—Alma Paint Varnish Co., W. Wolfe, mgr., 65 Duke 2 brick, concrete factory bldgs. **$40,0**

Ont., London—PLANT—A. Blashill, R. 6, London, plant. **$100,000.**

P. E. I., Summerside—PLANT—Geo. Wa Summerside, fish processing plant.

PLANS UNDERWAY

Md., Baltimore — BOTTLING PLANT Pepsi Cola Bottling Co., 400 Key Highw Bway. and Hartford Rd., plans by A. Radziszewski, 20 E. Lexington St., bottl plant. **$300,000.**

N. Y., New York—GARAGE—Fred French Investing Co., 551 Fifth Ave., Z 17, plans completed by W. I. Hohau 1841 Bway., Zone 23, 2 story, bsmnt. g age, 40 St. and Prospect Pl. **$70,000.** Mayper, 110 W. 40 St., Zone 18, cons engr.

Okla., Hugo—TURBINE UNIT, etc.—P lic Service Co. of Oklahoma, 600 S. Main Tulsa, plans 50% completed steam turb unit addn., and auxiliary equip. to generat plant. **$350,000.**

★**Okla., Tulsa**—TURBINE UNIT, etc Public Service Co. of Oklahoma, 600 Main St., plans 60% completed addn. ste turbine unit and auxiliary equip. to gener ing plant. **$900,000.**

Pa., Reading—WAREHOUSE—Corrug Container Corp., Grace and Meade Sts., pl completed by N. Grossman, c/o owner, wa house. **$175,000.**

Tenn., Memphis—LAUNDRY—Apex La dry, Inc., J. L. Whitescarver, mgr., 1 Lamar St., pans completed by Hanker Heyer, Commerce Title Bldg., rebuilding story, brick laundry bldg. **$100,000.**

Tex., Brownsville — PLANT — Food M chinery Corp., Harlingen, plans 50% co pleted by Bartlett Cocke, Milam Bldg., S Antonio, 1 story, 120x600 ft. food produ plant on 32 acre site. **$200,000.** W. E. Sim son, Milam Bldg., San Antonio, consult. en CD 12/16—ENR 12/23, under Industr Bldgs.

Utah., Ogden—SERVICE—Utah Power Light Co., Kearns Bldg., Salt Lake Ci plans by L. S. Hodgson, Eccles Bldg., ser ice bldg. **$100,000.**

★**Wash., Tacoma**—DEPOT—Chicago, M waukee, St. Paul & Pacific Ry. Co., W. Penfield, ch. engr., Union Station, 6, D new depot. **$1,250,000.**

Alta., Calgary—PASSENGER STATION Canadian National Rys., H. A. Dixon, c engr., 360 McGill St., Montreal, Que., a Canadian Pacific Ry. Co., J. E. Armstro ch. engr., Windsor Station, Montreal, Qu new union passenger station. **$250,000.**

CONTRACTS AWARDED

Ky., Louisville—PLANT—C. T. Dear Printing Co., 11 and Bway., 2 story bl addn., to Struck Constr. Co., 147 N. C St. **$250,000.**

Tex., San Antonio—WAREHOUSE, etc Summers Drug Stores Inc., 250 Colle St., warehouse storage and training sch bldg., to H. B. Zachry Co., P.O. Box 5 San Antonio, approx. **$150,000.** Adams Adams, 250 College St., archts.

PROJECTS CANCELLED

Tex., Houston — MECHANICAL SHOP Southwest Wheel Corp., 1433 Travis S Houston, mechanical shop. **$75,000.** Proje cancelled. To be built at once. CD 10/2 ENR 11/4.

UNCLASSIFIED

PROPOSED WORK

★**Calif., Fresno**—PARKS, etc.—City, par bldgs., grounds, **$1,245,000**; recreatio structures and imprvs., **$125,000**; electric work, **$170,000.**

Calif., Lakeport — AIRPORT — Lake C Lakeport, airport. **$100,000.**

★**Calif., San Jose**—AIRPORT, etc.—Sa Clara Co., airport, **$720,000**; wat parks, **$150,000.**

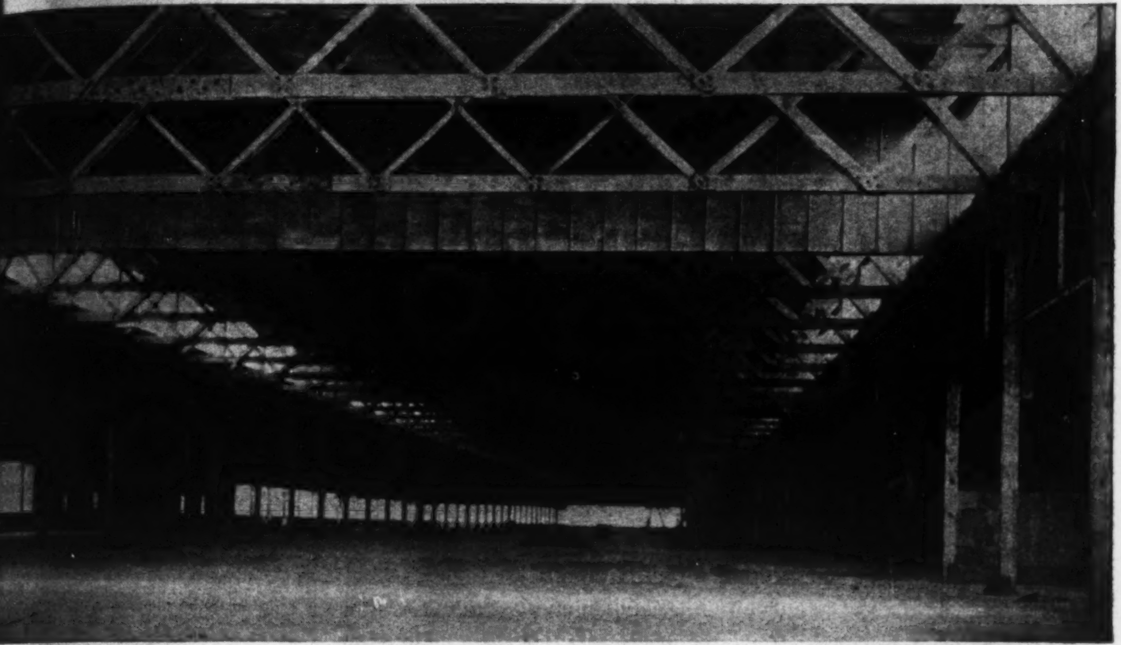
†**Conn., Danbury**—AIRPORT—Civil Ae nautics Admin., 385 Madison Ave., N York, N. Y., airport repairs, expansion la work, lighting sys., landing runways, pavi bldg. **$250,000.**

Conn., Guilford—BATHING BEACH, —Town, L. I. Dudley, first selectman, To Hall, bathing beach, bathhouses, etc. **$**

Ill., Decatur — RADIO STATION — Co modore Broadcasting, Inc., WSOY, De tur, FM radio station. Over **$25,000.**

Ill., Mt. Vernon—PARK, etc.—Mt. Vern City Park Bldg., City Hall, new park swimming pool, south part of town, **$10** enlarging present pool, **$25,000**; black about 3 mi. park roads, **$30,000**; 6 t

TECO FOR WAREHOUSES TOO



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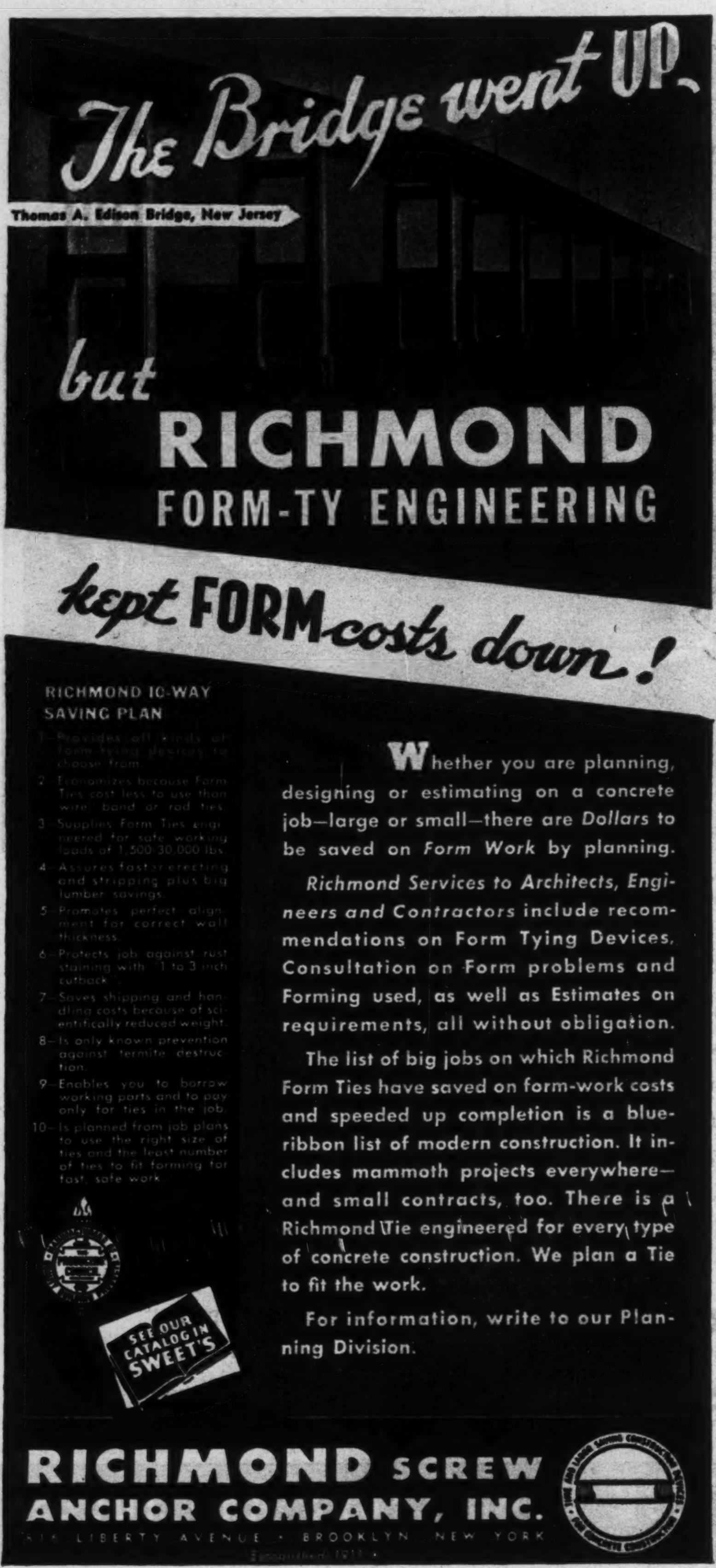
The Bridge went UP

Thomas A. Edison Bridge, New Jersey

but

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2—Economizes because Form Ties cost less to use than wire, band or rod ties.

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6—Protects job against rust staining with "1 to 3 inch cutback".

7—Saves shipping and handling costs because of scientifically reduced weight.

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POSTWAR PROJECTS (Cont'd.)

courts, open air theatre and band
seating 3 or 4,000 people located either
Mt. Vernon City Park or at park playgr
across from Mt. Vernon Junior High Sch
$150,000.

Ill., Quincy—RADIO STATION—Illi
Broadcasting Co., WTAD, Quincy, FM r
station. Over $25,000.

Ill., Rock Island—RADIO STATION—
Island Broadcasting Co., WHBF, Sa
Bldg., FM radio station. Over $25,000.

Ill., Springfield—RADIO STATION—C
modore Broadcasting, Inc., Springfield,
radio station, U.S. Hy. 36. Over $25,000.

Ill., Springfield — RADIO STATIO
WCBS, Inc., Leland Office Bldg., FM r
station. Over $25,000.

Ind., Bedford—AIRPORT—City, P.
tutter, mayor, modern airport, $60,000
more.

Ind., Indianapolis—RADIO STATIO
Capitol Broadcasting Corp., WISH, Bd.
Bldg., Indianapolis, FM radio station, C
$25,000.

La., New Orleans — RADIO STATIO
Loyola University, WWL, Roosevelt H
FM radio station. Over $25,000.

†**Me., Dexter**—AIRPORT—Civil Aero
tics Admin., 385 Madison Ave., New Y
N. Y., airport, incl. runways, etc. Over
000. Financing not yet provided for.

Me., Phippsburg — BEACH DEVEL
MENT—State Park Comn., State Office B
Augusta, Popham Beach development,
000. Financing not vet provided for.

Md., Olney—RADIO STATION—FM De
opment Foundation, Olney, FM radio sta
Over $25,000.

†**Mass., Lawrence**—AIRPORT—Civil
onautics Admin., 385 Madison Ave.,
York, N. Y., airport, two 4,000 ft. runw
hangars, etc. $400,000.

★**Mass., Northampton** — AIRPORT — C
Aeronautics Admin., 385 Madison A
New York, N. Y., airport, land construc
runways, paving, aprons, hangars, etc.
000.

Mass., Williamstown — AIRPORT — C
Aeronautics Admin., 385 Madison Ave.,
York, N. Y., airport, land construction
ways, bldgs., etc. $250,000.

Mich., Muskegon—RADIO STATION—
backer Radio Corp., WKBZ, 432 Apple A
FM radio station. Over $25,000.

Mich., Saginaw—RADIO STATION—S
naw Broadcasting Co., WSAM, Bay
Weiss Sts., FM radio station. Over $25,00

Minn., Hutchinson — AIRPORT — C
E. R. Dennis, clk., preliminary su
contemplated, municipal airport. $35,00

Minn., Sauk Center—AIRPORT—City, J
Schoenhoff, city clk., City Hall, munic
airport. $25,000.

Mo., Kansas City—RADIO STATIO
Midland Broadcasting Co., KMBC, Pick
Hotel, FM radio station. Over $25,000.

N. J., Newark—RADIO STATION—
Jersey Broadcasting Co., WHOM, 29 W
St., New York, N. Y., FM radio stat
Over $25,000.

N. J., Trenton—RADIO STATION—Me
Broadcasting Co., 600 Ingham Ave.,
radio station, Ewing Twp. $25,000.

N. Y., Brooklyn—RADIO STATION—
quency Broadcasting, Inc., 1 Hanson
FM radio station. Over $25,000.

N. Y., Jamestown—RADIO STATIO
James Broadcasting Co., Hotel Jamest
Bldg., FM radio station. To exceed $2

N. Y., Ogdensburg—RADIO STATIO
St. Lawrence Broadcasting Corp., WS
2315 Knox St., FM radio station. Over $2

N. Y., White Plains—BROADCAST
STATION—Westchester Broadcasting C
WFAS, Post Rd. and Chester Ave.,
broadcasting station. Over $25,000.

O., Cleveland — BROADCASTING S
TION—WGAR Broadcasting Co., 12
Euclid Ave., FM broadcasting station, Br
view and Atkins Rds. $25,000.

O., Columbus—BROADCASTING STAT
—United Broadcasting Co., WHKC, 22
Gay St., FM broadcasting station, O
Rd. $25,000.

O., Steubenville—BROADCASTING S
TION—Valley Broadcasting Co., WS
Steubenville, FM radio broadcasting sta
6 mi. west of here. $25,000.

O., Toledo—BROADCASTING STATIO
Toledo Blade, 541 Spurr St., FM broadc
ing station. $25,000.

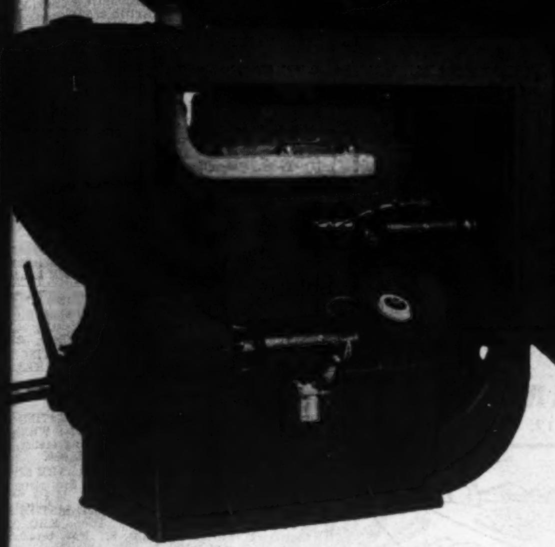
O., Youngstown—BROADCASTING S
TION—WFMJ Broadcasting Co., 101
Broadman St., FM radio broadcasting
tion, Austintown Twp. $25,000.

Okla., Oklahoma City—BROADCAST
STATION—Plaza Court Broadcasting
KOCY, Plaza Court, FM broadcasting
tion, 204 North Robins St. $25,000.

Okla., Oklahoma City—BROADCAST
STATION—WKY Radiophone Co., Sk
Tower Hotel, FM broadcasting station
north of here. $25,000.

Ore., Portland—BROADCASTING S
TION—Broadcasters Oregon Ltd.,
Southwest 19 Ave., FM broadcasting sta
$25,000.

Sheppard DIESEL
for Top Performance from
Iceland to Africa
Regardless of Temperatures and Service Conditions



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They're providing it right now in climates as varied as Iceland and Africa, Alaska and Mexico, Siberia and Brazil. Wherever you operate, you're sure of dependable power when you specify Sheppard—the Diesel that runs smooth in rough service.

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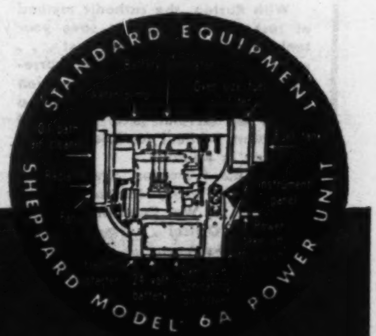

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1½ H. P. UNIT
GASOLINE POWERED

★★ Immediate delivery on Gasoline Powered 1½ H.P., and wheelbarrow or round base mounted 3 H.P. units on suitable priority.

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THE ATTACK
BUY
WAR BONDS

★ For their size, MALL Vibrators place more concrete per hour than any other vibrator.
★ They place a stiffer mix with importent savings in cement, sand and labor.
★ MALL vibrated concrete assures a better bond with reinforcement . . . is free from honeycombs and voids . . . permits earlier stripping of forms . . . and makes a stronger, water-tight job.
★ MALL Vibrators are easily portable, use very little fuel, are easy to start, and require little attention.
★ MALL Vibrating elements are ruggedly constructed for long service with welded, special metal tips that withstand abrasive action.
★ Variable speed gasoline engine operates 8 other tools easily interchangeable with the vibrating element.

Write at once for full details.

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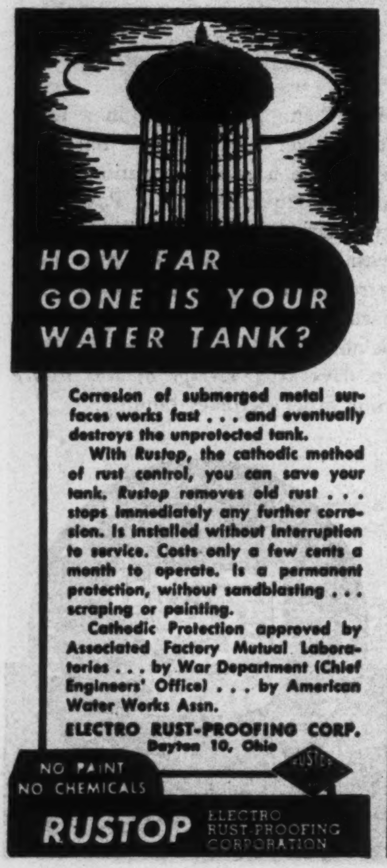
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Corrosion of submerged metal surfaces works fast . . . and eventually destroys the unprotected tank.

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Dayton 10, Ohio

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NO CHEMICALS
RUSTOP
ELECTRO
RUST-PROOFING
CORPORATION

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Expansion Joint Assemblies

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FOOLPROOF FUNCTIONING

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Williams Wallace Company
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San Francisco
California

POSTWAR PROJECTS (Cont'd.)

Pa., York—BROADCASTING STATIO
Susquehanna Broadcasting Co., WSBA, Y
FM broadcasting station, State Hy. 24, Sp
Garden Twp. **$25,000.**

R. I., Providence—BROADCASTING S
TION—Cherry & Webb Broadcasting C
WPRO, 15 Chestnut St., FM broadcas
station, near East Providence. **$25,000.**

R. I., Providence—BROADCASTING S
TION—Outlet Co., WJAR, 176 Weybo
St., FM broadcasting station, Hartford A
and Victory St. **$25,000.**

S. C., Charleston—BROADCASTING S
TION—Atlantic Coast Broadcasting C
WTMA, 133 Church St., FM broadcas
station, East Old Town Rd. **$25,000.**

S. C., Spartanburg—BROADCASTING S
TION—Spartanburg, Advertising Co., WS
224 E. Main St., FM broadcasting stat
Hogback Mountain. **$25,000.**

Tenn., Knoxville—BROADCASTING S
TION—American Broadcasting Corp., WE
531 S. Gay St., FM broadcasting stat
$25,000.

Tex., Amarillo — BROADCASTING S
TION—Amarillo Broadcasting Corp., KF
109 E. 5 St., Amarillo, FM broadcas
station, 109 E. 5 St. **$25,000.**

Tex., Beaumont—BROADCASTING S
TION—KRIC, Inc., 380 Wall St., FM bro
casting station, 130 Wall St. **$25,000.**

Tex., Dallas—BROADCASTING STATI
—A. H. Belo Corp., WFAA, 1122 Jack
St., FM broadcasting station. **$25,000.**

Tex., Dayton — PARK — Town, T. Coll
mayor, municipal park, 30 acre site dona
Over **$25,000.**

Tex., Harlingen—STADIUM—City, r
con. stadium. **$75,000.**

Tex., Wichita Falls — BROADCASTI
STATION—Rhea Howard, Wichita F
FM broadcasting station, Seymour Rd. w
of here. **$25,000.**

Utah, Salt Lake City—BROADCASTI
STATION — Intermountain Broadcas
Corp., KDYL, 143 S. Main St., FM broadc
ing station. **$25,000.**

Va., Norfolk—BROADCASTING STATI
—WTAR Radio Corp., National Bank
Commerce Bldg., FM broadcasting stat
National Bank of Commerce Bldg. **$25,**

Va., Richmond — BROADCASTING S
TION—Havens & Martin, Inc., WMBG,
West Broad St., FM broadcasting stat
Staples Mill Rd. near Broad Street
$25,000.

Va., Richmond — BROADCASTING S
TION—Richmond Radio Corp., WRNL,
E. Grace St., FM broadcasting station, C
tral National Bank Bldg. **$25,000.**

Wash., Longview—FIRE ALARM SYST
—City, City Hall, 25 box fire alarm
$25,000.

Wash., Spokane — BROADCASTING S
TION—Louis Wasmer, Inc., KHQ, Ra
Central Bldg., Zone 8, FM broadcast
station. **$25,000.**

★ **Wash., Tacoma**—PIERS, etc.—Port
Tacoma, altering piers and pier bl
$1,750,000.

W. Va., Beckley — RADIO STATION
Beckley Newspapers Corp., Beckley,
radio station, Flat Top Mountain. Est.
000.

W. Va., Charleston—RADIO STATIO
Charleston Broadcasting Co., WCHS, 1
Lee St., FM radio station top Bee Mount
on State Hy. 119. **$25,000.**

Wis., Green Bay — RADIO STATION
Green Bay Newspaper Co., Walnut
Madison Sts., FM radio station. Est.
000.

Wis., Oshkosh — BROADCASTING S
TION—Oshkosh Broadcasting Co., WO
151½ Main St., FM broadcasting stat
Co. Hy. A. **$25,000.**

Wis., Wausau — BROADCASTING S
TION—Record Herald Co., Wausau,
broadcasting station. **$25,000.**

Man., Winnipeg—AUTOMATIC DUMPE
—National Grain Co., Ltd., Winnipeg, inst
ing automatic dumpers along with adequ
dust collecting sys.. Lakehead Elevat
$75,000.

Ont., Oshawa—PLAYGROUND and R
REATIONAL CENTER—Kinsmen Club
Oshawa, development seven acre tract
land as playground and recreational c
ter, swimming pool, rest rooms
$55,000.

Ont., Port Stanley—STORAGE TAN
etc.—McManus Petroleums, F. J. Mo
genl. mgr., 225 Rectory St., London, ma
terminal consisting gasoline and oil stor
tanks, pipelines, railway sidings. **$75,**

PLANS UNDERWAY

★ **Calif., Los Angeles**—AIRPORT—City
P Wks., City Hall, expan. airport
volving acquisition 1,844 acres suppleme
ing 625 acres now owned, incl. two 10,00
runways, administration and other bl
$25,000,000. Funds available to purch
site. L. Aldrich, City Hall, city engr.

Conn., Stratford—PARK, etc.—Town,
Shea, mgr., Town Hall, park, incl. war
morial, athletic field Legion Bldg., grad
drainage. **$300,000.** H. W. Johnson,
Glenridge Rd., archt.

Ind., Greenfield — AIRPORT — Green
Airport Co., R. A. Smitheman, pres.,
Main St., plans 25% completed airport.
000.

USE Keystone
TONGUE & GROOVE
EXPANSION JOINT
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EXPANSION JOINT
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Longitudinally and Transversally
gives
MAXIMUM LOAD EFFICIENCY

The keyed-joint principle of Keystone premoulded asphalt mastic board joint allows for normal expansion and contraction and distributes the load without cracking. Its approved by U. S. Engineers, Navy Department and State Highway Department.

There are no "blow-ups", no "rough-riding" surfaces when this rigid, waterproof and flexible joint is used both longitudinally and transversally. Easily installed and available for immediate shipment. Samples sent on request.

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GENERAL OFFICE
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MANUFACTURING PLANT • CHICAGO HEIGHTS, ILL.

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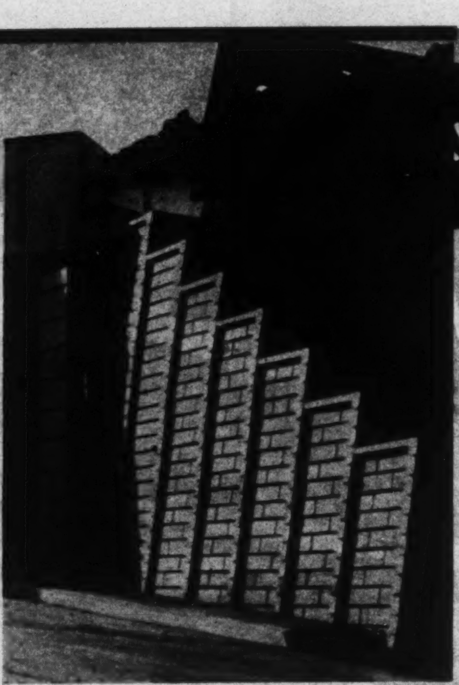
NO Forms or Skilled Labor Needed—

to build abutments, piers, approaches, retaining walls, etc., that defy time and please the eye, with



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26 Plants in Eastern, Central, Southern & Southwestern Locations
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Reservoir Lining
Dam Repairs
Pen Stock Lining
Tunnel Lining
Smoke Stack Lining
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DIESEL • ELECTRIC • GASOLINE • STEAM
The OHIO LOCOMOTIVE CRANE CO.
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POSTWAR PROJECTS (Cont'd.)

★**La., New Orleans**—AIRPORT TER
INAL, etc.—City, City Hall, airp
[illegible] and landing strips. $5,000,000.
[illegible] Hall, engr.
[illegible] AIRPORT—City Tra
[illegible] ont [illegible] plans underw
[illegible] e 5,000
[illegible] RETAIND
[illegible] Dpt. P[illegible] & Recreation,
[illegible] St., plans 15% completed 150
[illegible] retaining wall, 20 ft. high, for
[illegible] Cemetery, $10,000; plans 10% co
pleted Livingstone Memorial landscap
imprv. on Belle Isle, $206,000. Geo.
Thompson, City Hall, city engr. CD 3/30/4
ENR 4/1/43.

Mich., Detroit—PARK IMPROVEMEN
—Detroit Zoological Park Comn., Ten M
Rd., Royal Oak, concrete, steel pavil
$50,000; and Anthropoid Ape exhibit, $12
000. Geo. R. Thompson, City Hall, city en

★**Mich., Northville**—PARKWAY DEVE
OPMENT—Wayne Co. Rd. Comn., 3
Barlum Tower, Detroit, Middle Rouge Pa
way exten., incl. 5 primary and 8 seconda
comfort stations, garbage incinerators, t
and storage and concession bldg., f
bridges, gravel drives, bridle paths, pl
ground and picnic areas, drinking founta
etc., $810,000; Middle Rouge Parkway fr
Northville to Newburgh Rd., $290,000. L
Smith, 3800 Barlum Tower, co. hy. engr.

Mo., Jefferson City—AIRPORT—City, a
port development etc. $200,000. Black
Veatch. 4706 Bway., Kansas City M
engrs. CD 4/3—ENR 4/20.

Neb., Crete—SWIMMING POOL, etc.—Ci
F. Hobbs, mayor, City Hall, swimming p
and park recreational addns. $40,000. H.
Davis, Crete, consult. engr.

Neb., North Platte—SWIMMING POO
City, S. P. McFarland, mayor, City H
swimming pool. $65,000. R. F. Nosky, c
engr.

★**New York** — TUNNEL — President Ma
hattan Boro, W. D. Binger, comr. B
Wks., Municipal Bldg., Zone 7, New Yo
plans completed Brooklyn-Battery Tun
approaches, connections (PM-27). $10,025,
D. G. Edwards, ch. engr.

N. Y., Buffalo—STREET LIGHTING—C
Council, Dpt. P. Wks., City Hall, prelimin
plans underway street lighting imprv. p
$400,000.

N. Y., New York—SUBWAY IMPROV
MENTS—President Manhattan Boro, W.
Binger, comr. Boro Wks., Municipal Bld
Zone 7, plans underway subway entra
and exit alterations, W. 72 St. and Bw
(PM-13), $220,000; widening, altering s
way structures, Schiff Parkway from Bowe
to Williamsburg Bridge (PM-38), $185,
for Bd. Transportation, 250 Hudson S
Zone 13. D. G. Edwards, ch. engr.

★**N. Y., New York**—TRACK REMOVA
etc.—President Manhattan Boro, W.
Binger, comr. Boro Wks., Municipal Bld
Zone 7, plans underway track removal a
pavement restoration Bway., 207 to 225 St
Bway., 225 St. to Boro Line, 207 St., Bwa
to Harlem River, Center Line, 225 St., Bwa
to Boro Line, 218 St., Bway to Car Ba
10 Ave., Bway. to Car Barn, (PMS-17
$200,000; 59 St., 1 to 2 Aves., 59 St., 5 to
Aves., pave curb to curb, (PMS-172), $
000; 181 St., Bway. to Washington Brid
Amsterdam Ave. 165 to 190 Sts., (PMS-16
$200,000; Bway., 169 to 207 Sts., (PMS-17
$200,000; Amsterdam Ave., 65 to 59 Sts.,
Ave., 59 to 42 Sts., 42 St., 10 to 12 Aves.,
St., 10 to 8 Aves., (PMS-167), $200,000;
St., 8 to Madison Aves.; 42 St., Madison
Park Aves., 42 St., Park to 1 Aves.,
Nicholas Ave., 162 to 169 Sts., (PMS-16
$190,000; Park Row, Bway. to James
Chatham Sq., Bowery, Division St. to 3 Av
(PMS-162), $168,000; 3 Ave., 4 to 42 S
(PMS-163), $200,000; 3 Ave. 42 to 80 S
(PMS-164), $200,000; 3 Ave. 80 to 118 S
(PMS-165), $200,000; 3 Ave. 118 to 130 S
125 St., East River Dr. to 8 Ave., (PMS-16
$200,000; subway alterations for roadw
widenings at various locations (PMS-17
$200,000. State Aid Planning Funds allott
D. G. Edwards, ch. engr.

Tenn., Memphis — TESTING STATION
City, J. Boyle, comr., Police Station, 2 a
Adams Sts., preliminary plans 90% co
pleted by Hanker & Heyer, Commerce Ti
Bldg., 6 lane automobile testing statio
$150,000.

N. B., Saint John—PARKS, etc.—Muni
pality, constructing parks and playgrou
$140,000; retaining walls, $100,000. D.
Smith, City Hall, engr.

Ont., Timmins — SWIMMING POOLS
Municipality, A. L. Shaw, clk., 2 swimmi
pools, $50,000. J. D. MacLean, Town Ha
engr.

Que., Montreal—SWIMMING POOLS—M
nicipality, J. A. Mongeau, city clk.,
swimming pools, $50,000 each. H.
Gibeau, City Hall, engr.

★**Sask., Saskatoon**—FIRE ALARM SY
TEM, etc.—Municipality, installing f
alarm sys., equip., $100,000; imprv., ex
electrical distr. sys., $100,000; park and riv
bank imprvs., $200,000; natural gas ma
to Saskatoon and constructing distr. sy
connections and services within city, $4,
000. H. M. Weir, Saskatoon, acting city en
CD 1/17—ENR 1/27.

CONSTRUCTION REPORTS

Compiled by Business News Department—Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

ELSIE EAVES, Manager *SCOTT McLEOD, Statistics* *J. A. MAHONEY, Reports*

(Daily service also available—Write for details)

WATER SUPPLY

OSED WORK

Perryville—Southern Natural Gas Co., Bldg., Birmingham, Ala., water cool- s. **$25,000.**

Canton — Comrs. Stark Co., Canton, resolution to construct water distr. with fire hydrants for residents of Dist. of Reedburban Genoa Sewer in Genoa. $155,358. L. Zerbe, Canton,

Fort Worth—City, S. H. Bothwell, City Hall, making plans water facili- $46,000. Applied for FWA funds to te job. Freese & Nichols, Capps Bldg.,

Minden—City, c/o L. Duncan, mayor, election to vote $125,000 bonds, water ewage disposal plant imprvs.

Weatherford—City, C. Russell, may- aking preliminary plans, water and extens. $50,000. Applied for FWA J. J. Rady, Insurance Bldg., Fort engr.

Wisconsin Rapids—City, bids soon 8 to 10 wells, later pump houses, etc. C. A. Cajanus, city engr.

Minnedosa—Municipality, WW sys. T. H. Porter, Portage la Prairie,

ASKED

Bids Asked September 26

Chilton—City, O. A. Horst, clk., houses, reservoirs, etc. Bids 8/29 re- CD 8/22—ENR 8/24.

Bids Asked October 2

Aliquippa—Boro., E. W. Devitt, secy., ipal Bldg., 6 single cased wells or 2 wall wells, 2 m.g.p.d. needed, steel 600 ft. 10 in. c.i. suction main and and 100 ft. 6 in. c.i. blow off mains, appertenances, at Crow Island. Plans deposit $15 refundable, 10% bond. Morris Knowles Co., 1312 Park Pittsburg, engr.

Bids Asked October 3

Ottawa—W. E. MacDonald, engr. c/o and Chairman Bd. Control, ity Hall, purification bldg. addn., 2 addnl. beds at Lemieux Water Purification $80,000. CD 8/1—ENR 8/9.

Bids Asked About October 16

Fort Pierce—City, addnl. water sup- ncl. 1 m.g. reservoir and treatment ies, $1,000,000. **FWA.** Smith & Gilles- Packard Bldg., Jacksonville, Zone 2, CD 8/15—ENR 8/23.

Bids Asked About October 16

Fort Walton—City, addnl. water and facilities, $200,000. **FWA.** Smith & pie, Packard Bldg., Jacksonville, Zone rs. CD 8/24—ENR 8/31/44.

BIDDERS

Hartford — Bd. Contr. & Supply politan Dist., 850 Main St., Sept. 11, nical cleaning and lining with cement r 7½ mi. 42 in. c.i. pipe by centrifugal ne, Nepaug Water Line 1, in Avon, gtca and Farmington, from Lock Pipe Co., Newington Ave., Newington 78. CD 8/21—ENR 8/24.

Chicago—City, Dpt. P. Wks., City ll, Sept. 12, general contract superstruc- filter and administration bldgs., Dist. Filtration Plant, from S. N. n Co., 2050 W. Augusta St. **$1,497,000.** /29—ENR 8/31.

Towson — Comrs. Baltimore Co., House, dismantling 200,000 gal. steel tank and tower, at Essex, and trans- re-erecting here, Md. 18-208, from rgh-Des Moines Steel Co., Neville Is- Pittsburgh, Pa., **$33,750. FWA.**

Concord—State, Comptroller Office, House, Sept. 12, addnl. water supply State Hospital, from Orr & Rolfe Co., ge St., **$16,850.**

Knoxville—State Charitable & Penal tions Comn., W. O. Beard, secy., at A. G. Jeans, purch. agt., State Office Nashville, Sept. 6, water treatment incl. 2 sedimentation and 1 coagula- nks, 1 clear well tank, 2 filters, 2 at Eastern State Hospital, from Fred ks Constr. Co., 715 S. Bway., **$79,847.** 31.

Houston—City, M. H. Westerman, City Hall, Sept. 13, 8 in. c.i. watermain pter St. and 12 in. c.i. main in Oates m W. A. McClendon, 4617 Walker Ave., **$51,887,** est. $50,000; 36 in. watermain high pressure line from pump station at Edlow, from Claude Everett, Inc., 522 Barzisa St., Houston, **$98,800,** est. $108,000; 30 and 36 in. collecting line from S.W. well field to S.W. pump station, from Lock-Joint Pipe Co., Ampere, N. J., **$163,531,** est. $175,000. J. Dannenbaum, City Hall, engr.

†Tex., Houston—Federal Works Agency, 802 Electric Bldg., Fort Worth, Sept. 13, Contr. 3, constructing, installing Water Supply Plants 1 and 2, incl. structures, drives, walkways, parking areas and fencing, valves, piping, etc., Tex. 41-644-F, from Gayle Bros., 803 Blodgett St., **$60,040.** J. C. Calhoun, Merchants Exchange Bldg., engr. CD 9/1.

CONTRACTS AWARDED

†Ga., Marietta—U. S. Eng., Post Office Bldg., Savannah, reservoir repairs, alterations No. MAP 3-45, at Aircraft Assembly Plant, to Arthur Pew Constr. Co., 2117 Piedmont Rd. N.E., Atlanta, **$19,098.** Bids 9/2.

N. H., Northfield — Golden Rule Farm Homes Assoc., W. R. Westwood, supt., Northfield, water supply for fire fighting, 75 x 150 ft. reservoir, piping, hydrant, to Manchester, Sand, Gravel & Cement Co., Inc., 839 Elm St.. Manchester, **$15,000.** E. F. Mageneau, Center St., engr. Awarded 9/11.

O., Deshler — Village, K. L. Baughman, clk., Town Hall, water softener sys., to Gang Engr. Co., 31 N. Summit St., Akron, **$33,000.** Finkbeiner, Pettis & Strout, Home Bank Bldg., Toledo, engrs. CD 7/6—ENR 7/13.

†Tex., Camp Hood—U. S. Eng., Fort Sam Houston, water supply line repairs, own forces. **$20,000.** CD 6/13—ENR 6/15.

†Tex., Kelly Field—U. S. Eng., Fort Sam Houston, altering, imprv. water distr. and fire protective sys., to Truehart & Caldwell, American Hospital & Life Insurance Bldg., San Antonio, approx. **$15,000.**

Location of ENR Correspondents

Symbols and Abbreviations Include:

†	Federal Government
★	Project of $500,000 or over
ENR	Engineering News-Record
CD	Engineering News-Record Construction Daily
A-E-M	Architect-Engineer-Management type of contract

Projects—By Size

Construction projects here reported cover the United States and Canada, are of these minimum sizes or larger; water supply, earthwork, waterworks, $15,000; other public works $25,000; industrial buildings, $40,000; other buildings, $150,000.

Classes of Construction

(Named in order of Listing)

Water Supply
Sewers, Waste Disposal
Bridges
Streets & Roads
Earthwork, Waterways
Latin America
Public Buildings
Commercial Buildings
Industrial Buildings
Unclassified

Stages Reported

PROPOSED: (except Streets & Roads):
BIDS ASKED (new announcements only. For full calendar, see also preceding issues of ENR);

LOW BIDDERS: On jobs below $500,000 value all low bidder news will be the final reports published on the projects involved except where award is not made to the low bidder. In this case, a supplementary contract award report will be published.

CONTRACTS AWARDED: Except awards to low bidders previously reported in low bidder stage.

Dates shown are of issue in which last previous report was published.

SEWERS, WASTE DISPOSAL

PROPOSED WORK

Calif., San Diego—City, Civic Center Bldg., 8,000 lin. ft. vitr. clay sanitary sewer. $142,000.

Fla., Fort Pierce—City, bids soon sewage treatment plant, $200,000. Smith & Gillespie, Packard Bldg., Jacksonville, Zone 2, engrs.

★**†Fla., Orlando**—City, making plans exten., imprv. sanitary sewerage sys. $1,800,000. **FWA.** Smith & Gillespie, Packard Bldg., Jacksonville, Zone 2, engrs.

★**†Fla., Panama City**—City, bids soon, sanitary sewerage sys. imprvs. $800,000. Smith & Gillespie, Packard Bldg., Jacksonville, Zone 2, engrs.

★**†Ill., Granite City**—City, approx. 17,500 ft. 18- to 84-in. relief sewers, necessary manholes, pump. sta., installing pump. equip., etc. Ill. 11-302-N. $581,925. **FWA.**

Ind., Syracuse—Town Bd., W. Zerby, pres., making plans, sewage treatment plant. $30,000. Don Lessig, Warsaw, engr.

Man., Minnedosa—Municipality, sewerage sys. $60,000. T. H. Porter, Portage la Prairie, sanitary engr.

†Mo., St. Louis County — Affton Sanitary Sewer Dist., sewerage sys. imprvs., addns., incl. installing approx. 5,500 ft. 8 in. sewer, 25 manholes, 3 pumps, constructing pumphouse, appurtenances, Mo. 23-284-N. $45,000. **FWA.**

O., Lakewood—City, A. F. Kauffman, dir. P. Wks., 14532 Lake Ave., $200,000 bond election Nov. 7, storm and sanitary sewers in various streets. E. A. Fisher, 14532 Lake Ave., city engr.

Tex., Austin—City, c/o W. E. Seaholm, acting city mgr., rejected bids Sept. 6, storm sewers in Kinney Ave., Virginia to Ashby Aves. J. E. Motheral, city engr. CD 9/12—ENR 9/14, under LB.

Alta., Westlock—Municipality, sewerage sys. and sewage disposal field, etc. $25,000.

B. C., Brighouse—Richmond Twp., R. C. Palmer, clk., Brighouse, exten. sewerage sys. $35,000. J. C. Johnstone, Town Hall, engr.

B. C. Nelson—Municipality, storm sewers $33,000. S. H. Dawson, City Hall, engr.

Ont., Kenora—Municipality, J. McCoombs, supt. P. Wks., Town Hall, sewage treatment and disposal plant, expanding sewers $40,000.

BIDS ASKED

Bids Asked September 25

Que., Drummondville—J. Marier, city clk., sewers. $50,000. Plans deposit $2. O. Bessette, City Hall, engr.

Bids Asked October 10

Calif., Los Angeles—Bd. Supervs. Los Angeles Co., Hall of Records, 10,400 lin. ft. 6 and 8 in. vitr. clay sanitary sewers in Exeter and other streets. C. I. 1094. Over $25,000. A. Jones, Hall of Records, engr.

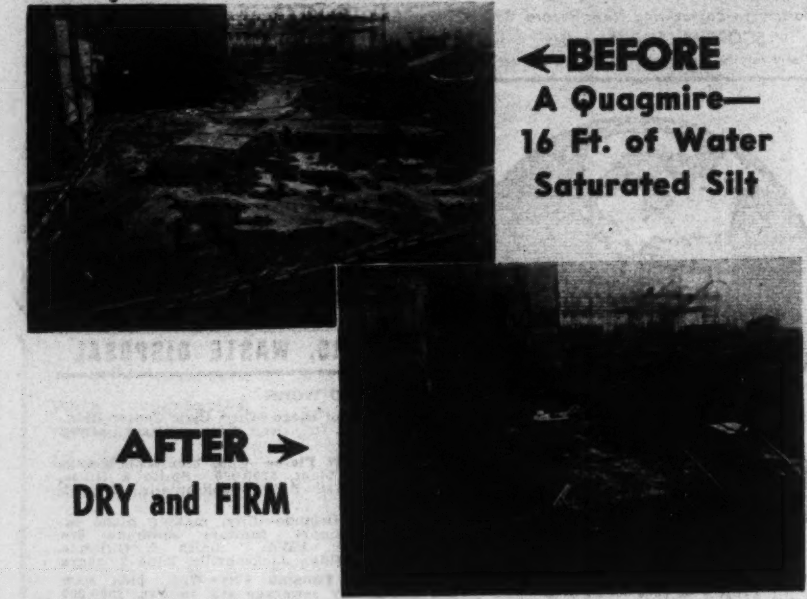
LOW BIDDERS

Calif., Los Angeles—Bd. Supervs. Los Angeles Co., Hall of Records, Sept. 13, vitr. clay sanitary sewer in Northside Dr. and other Streets, from M. Miller, 877 N. Bunker Hill Ave., **$148,260.** CD 8/21—ENR 8/24.

†Calif., Vacaville — City, sewer facilities from Basic Vegetable Products Co. to sewage plant, approx. 9,000 ft., Calif., 4-602-N, to M. J. Lynch, Barneveld and Oakdale Ave., San Francisco, **$51,800. FWA.** C. E. Bentley, 216 Pine St., San Francisco, engr. CD 4/11—ENR 4/13.

†La., New Orleans—Sewerage & Water Bd., 526 Carondelet St., sewer imprvs. for housing, La. 16-103, to American Heating & Plumbing Co., Inc., 829 Baronne St., **$32,200. FWA.** Fromherz Associates, Carondelet Bldg., engrs. CD 9/5—ENR 9/7.

Another Griffin Wellpoint Job



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GRIFFIN WELLPOINT CORPORATION

SEWERS, WASTE DISPOSAL (Low Bidd

N. C., Burlington—City. E. B. Hor mayor, approx. 4 mi. sewer extens., to G Spruce. Greensboro, $40,055. Bids CD 9/6—ENR 9/7.

†Pa., Phila.—U. S. Eng., Penn Mu Bldg., 6 and Walnut Sts., Sept. 12, disp basin, excav., dike work, drainage di and sluice box, Hog Island, from Con Foundation Co., 215 S. 17 St., $62,070. CD

S. C., Charleston—City, installing dr and sewers various streets northwest from Charleston Constructors, Inc., Tr St. and Adger's Wharf, $37,010. CD —ENR 8/17.

CONTRACTS AWARDED

O., Youngstown—City F. Cavalier, Finance, City Hall, incinerator furnaces, Pittsburgh-Des Moines Steel Co., Nev Island, $67,010. Former bids rejected. 8/10—ENR 8/17. under LB.

BRIDGES

PROPOSED WORK

★**Pennsylvania**—Commonwealth of Pe sylvania, J. U. Shroyer, secy. Harrisburg, plans 2 concrete hy. brid Route 140, Lebanon Co. $700,000.

Pennsylvania—Union Railroad Co., H. Sayre, ch. engr., Frick Bldg., Pittsbu Zone 30, open deck, single track, deck der, railroad bridge between E. Pittsb Boro and N. Versailles Twp., Allegheny

BIDS ASKED

Bids Asked September 28

Arkansas—J. H. Crain, chn., State Dpt., Little Rock, 186 ft., rein.-con. water bridge, Benton Co.; 0.206 mi. proach and one 511 ft. treated timber re con. bridge at Beaver, Carroll Co.; mi. approach and one 382 ft., rein.-c structural steel bridge over Little River at Higden, Cleburne Co. CD ENR 9/14.

Pa., Pittsburgh—F. M. Roessing, dir. Wks., City County Bldg., removing deck on approach spans and replacing rein.-con., repairing downstream sidew on approach spans, Smithfield St. bri $30,000. H. S. Ayres, 355 City Co Bldg., city engr.

Bids Asked September 29

Minnesota—State Hy. Dpt., St. P Bridge 6379, involving erecting used low truss span, together with construc two 15 ft. beam span approaches, length 91.5 ft., and Bridge 8617, concrete culvert 31.7 ft. long, S.P. 8506-14 (Trunk 61-3) on Goodview Rd., ½ mi. west Winona. $35,000. Plans deposit $1.05. J. Miller, bridge engr.

Bids Asked October 5

California—State Div. Hys., State Bl Los Angeles, 0.2 mi. existing timber bri with concrete deck to be raised to grade, approaches to be graded, plant surfacing to be placed on bituminous facing treatment, Orange Co. G. T. McC Pub. Wks. Bldg., Sacramento, state hy. e

LOW BIDDERS

★**California**—State Div. Hys., Sacrame Sept. 13, reconstructing portion exist bridge across Sacramento River, Rio Vi Sacramento Co., from Lord & Bishop, P. Box 812, Sacramento, and A. Teichert Son, Inc., P. O. Box 1113, Sacrame

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BRIDGES (Low Bidders, Cont'd.)

$727,858; repairing 4 timber trestle bridges, San Joaquin Co., from D. Caputo, 985 Delmas Ave., San Jose, **$26,319**. CD 8/25—ENR 8/31.

Louisiana—State Hy. Dpt., D. Y. Smith, dir., Baton Rouge, Sept. 6, repairing East Park Ave. Bridge, (Houma), Terrebonne Parish, from Robinson & Young, Louisiana Natl. Bank Bldg., Baton Rouge, **$39,623**. CD 8/22—ENR 8/24.

Missouri—State Hy. Comn., Jefferson City, Sept. 1, two 70 ft. and one 80 ft. I-beam spans, etc., Johnson Co., from Frank Trager, Chillicothe, **$36,222**. CD 8/22—ENR 8/24.

N. Y., New Rochelle—Bd. P. Wks. Westchester Co., County Office Bldg., White Plains, Sept. 11, repairing bascule bridge and plaza, Glen Island, from Reese Tubman Corp., 11 Bway., New York, Zone 4, **$36,980**.

New Jersey—Essex and Hudson Joint Bridge Comn., Hall of Records Bldg., Newark, Sept. 7, reconstructing fenders on bridge over Passaic River, from Linde-Griffith Co., 452 Passaic St., Newark, **$30,714**. CD 9/1.

STREETS AND ROADS

BIDS ASKED

Bids Asked September 26

Ill., Joliet—B. K. Preston, supt. hys. Will Co., County Bldg., 13,800 tons 20 ft. bit. surface C-6 mod. 2,925 tons aggregate base reconditioning for Project 116-IT-MFG. Over $25,000. Plans deposit $5.

La., Lake Charles—C. W. Gabbert, secy. Calcasieu Parish Police Jury, paving ¼ mi. parish road from Maplewood St. to Access between U.S. Hy. 90 and rubber refinery plant. $30,000. John W. Harris, Associates, Lake Charles, engrs.

Bids Asked September 27

Kansas—State Hy. Dpt., Garnett, resurfacing material 20.82 mi. P. 4773, 13.351 mi. P. 4774, both Anderson Co.; 6.6 mi. P. 4768, 18.991 mi. P. 4775, 7.51 mi. P. 4777, 2.474 mi. P. 4776, 4 mi. P. 4778, all foregoing in Bourbon Co.; 4.855 mi. P. 4779, Coffey Co.; 11.227 mi. P. 4780, 2.405 mi. P. 4781, both Franklin Co.; 3 mi. P. 4782, 3.019 mi. P. 4783, both Linn Co.; 19.685 mi. P. 4784, 7.572 mi. P. 4785, both Miami Co.; 6.02 mi. P. 4786 and 4.667 mi. P. 4896, both Neosho Co. R. C. Keeling, Topeka, engr.

Bids Asked September 28

N. J., Galloway—Town, 2696 White Horse Pike, Cologne, bituminous surface treating 30,380 sq. yd., prepared gravel surfacing 30,380 sq. yd. Odessa Ave. $35,000. E. Friedley, 705 N. Main St., Pleasantville, engr.

Bids Asked September 29

Georgia—State Hy. Dpt., R. G. Clay, dir., Atlanta, pebble soil base on 6 mi. Quitman-Monticello, Florida Rd., State Route 76, SAP 1543(2), Brooks Co., grading, reconstructing roadbed, surfacing 3.441 mi. Savannah-Tybee Rd., FAP 2742-A(1), Chatham Co.; grading, top soil base 5.54 mi. Sparta-Greensboro Rd., State Route 15, SAP 964-B(4), Hancock Co.; concrete traffic lane 1.117 mi. Dublin-Jeffersonville Rd., State Routes 19 and 31, FAP SN-A FAP 470-A(4), Laurens Co.; grading, surface treating 5.54 mi. Donaldsonville-Colquitt Rd., FAP 2715-B(1), Seminole and Miller Counties.

Kentucky—State Dpt. Hys., Frankfort, concrete repair (patching) 3.503 mi. The Henderson-Evansville Rd. from Henderson to Ohio River Bridge, MP-51-19-BC; 13.44 mi. Henderson-Dixon Rd. from junction with US 60, 1 mi. west of Henderson to Webster Co. line, MP-51-159-A, both Henderson Co.; 6 mi. Morganfield-Marion Rd., from Morganfield to approx. 5 mi. east of Sturgis, MP-113-167-B, Union Co.; 9.349 mi. Dixon-Henderson Rd. from Dixon to Henderson Co. line, MP-117-9-B, Webster Co.; exten. wing walls and incidentals to Loyall Municipal Bridge, SP 48-248, Harlan Co.; roadside planting 0.174 mi. London-Corbin Rd. beginning 864 ft. south south corporate limit of London and extend. along Pine Grove Cemetery, SP-63-111, Laurel Co.

Minnesota—State Hy. Dpt., St. Paul, grading S.P. 8506-13 (Trunk Hy. 61-3) between point 1.5 mi. west and 0.5 mi. east of west city limits of Winona, involving 144,983 cu. yd. excav. for roadway, dike and channel construction in reservoir, over $25,000. Plans deposit $1.45; production of mineral aggregate for traffic-bound gravel wearing course and for stockpiles for Maintenance Division, crush, screen, load and haul about 23,150 cu. yd. gravel, Mankato, over $25,000. O. L. Kipp, ch. engr.

Bids Asked October 3

La., Pineville — Town, at office R. C. Lawrence, mayor, concrete paving, necessary drainage appurtenances Oakland and Tudor Sts., sidewalks, curbs, gutters, Main St. Plans deposit $4. Pan American Engineers, 912 5 St., Alexandria, engrs.

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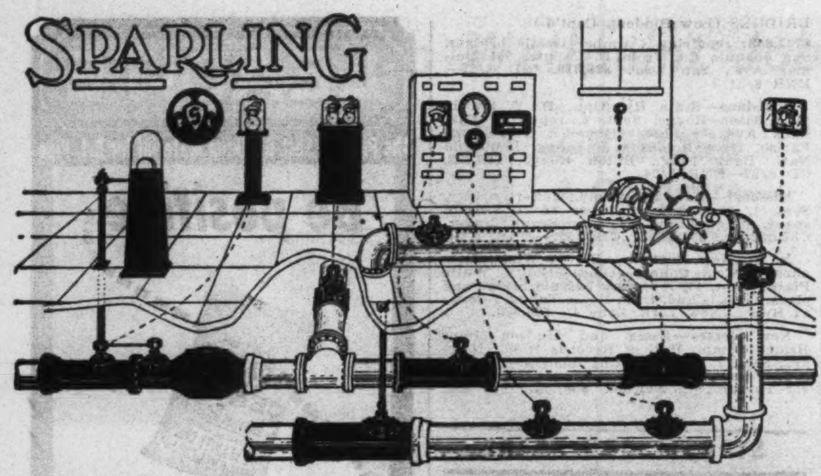

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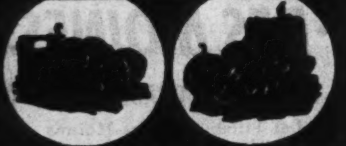

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STREETS AND ROADS (Bids Asked, Cont'

Bids Asked October 3

Washington—State Hy. Dpt., Olympia, li bituminous surface treating, 3 treated p timber bridges and 3 untreated pile, tim detour bridges on 5.709 mi. Secondary S Hy. 13-A in Aberdeen, Grays Harbor C ballasting, surfacing, stockpiling surfac materials on State Hys. 12-D and 1 Cowlitz and Wahkiakum Counties. Pl deposit $2. B. Bantz, hy. dir.

Bids Asked October 4

New York—H. A. Cohen, dir. Bureau C tracts & Accounts, State Dpt. P. W Albany, gravel double surface treating mi. hy. Orange Co. Plans deposit $10. C. Sells, supt. P. Wks., Albany; adv. 9/21.

Bids Asked After November 7

S. C., Charleston—City, curbing in nor western sect. city. Bids 8/31 rejected. 9/6—ENR 9/14, under LB.

Bids Asked

Kansas—State Hy. Dpt., Ottawa, rejec bids Sept. 1, resurfacing material 6.8 Proj. 4768. CD 8/22—ENR 8/24.

Minn., Rochester—State Hy. Dpt., Paul, rejected bids Aug. 25, crushed r surfacing, crush screen, load and haul a 32,508 cu. yd. traffic bound crushed r wearing course, $35,000. O. L. Kipp, owner, ch. engr. CD 8/9—ENR 8/17.

Tex., Greta—Humble Pipe Line Co., Corp Christi, at office P. G. Young, engr., Co House, Refugio, soon lets contract gradi drainage structures, flex base (caliche) a single asphalt surface course, Lamb Ranch, near here.

LOW BIDDERS

†California—Pub. Roads Admin., Phel Bldg., San Francisco, Sept. 12, 6.767 mi. cess road to Alameda Naval Air Statio Calif. DA-NR 73(1), Alameda Co., fr Louis Biasotti & Son, 40 West Clay Stockton, **$80,760.** C. C. Norris, Phelan Bld dist. engr.

California—State Div. Hys., Sacrame Sept. 13, imprv. 5.4 mi. Kern Co., from Cl W. Wood, Inc., 816 W. 5 St., Los Angel **$106,070.** CD 8/25—ENR 8/31.

Calif., San Jose—Supervs. Santa Clara C Court House, San Jose, imprv. San Jo Stevens Creek Rd. and Mtn. View-Steve Creek Rd. from Grand to San Jose-Steve Creek Rds., in Supervisor Dist. 5, from A. Raisch, 900 West San Carlos St., **$79,563** a **$40,828** respectively.

Ill., Highwood—J. Ugolini, city clk., Ci Hall, Sept. 8, concrete paving 5,560 sq. y etc. Sect. 6-CS, from Eric Bolander Const Co., Winchester Rd., Libertyville, **$25,** Est. $25,000. James Anderson Co., 290 Deerpath St., Lake Forest, engr.

Ill., Wheaton—DuPage Co., County Bld Sept. 5, imprv. 3.9968 mi. road, from Arro Petroleum Co., 7419 Franklin St., Fore Park, **$32,880.** CD 8/29—ENR 8/31.

Indiana—State Hy. Comn., S. C. Hadde chn., Indianapolis, Sept. 12, imprv. 2.52 m Johnson Co., from Middle West Roads C Noblesville, **$48,445.** Est. $52,731. CD —ENR 9/7.

Kentucky—Dpt. Hys., Frankfort, Sept. imprv. 11.738 mi. Adair Co., and 16.345 m Green and Metcalfe Counties, from Cumbe land Constr. Co., Burkesville, **$79,123** a **$104,961** respectively. CD 8/29—ENR 8/

Mass., Boston—Dpt. P. Wks., City Ha Sept. 11, bit. concrete paving Arcadia S Dorchester from National Contg. Co., In 110 Washington St., Somerville, **$34,748.**

Michigan—State Hy. Dpt., Lansing, Se 15, concrete pavement widening approx. mi. Ford Rd., east of Schaefer Hy., fro Schaefer to Reuter Rd., SN-82-130C-1 M-153 Wayne Co., from Julius Porath Sons Co., 702 Transportation Bldg., Detro **$28,414;** approx. 1 mi. Gratiot Ave., U.S. between 8 and 9 Mile Rds., SM-50-27C- Macomb Co., from Denton Constr. Co., 170 General Motors Bldg., Detroit, **$43,** CD 9/6.

★**Ohio**—State Hy. Dpt., Columbus, Sept. 1 imprv. 0.407 mi. Scioto Co., from Fran Bros., Box 27, Sidney, **$100,689*****1.4 Williams Co., from S. E. Johnson Co., Terminal Bldg., Toledo, Zone 2, **$34,330*** 2.443 mi. Berry Co., from Brewer & Brew Sons, 81 W. Water St., Chillicothe, **$41,7** est. $41,800***2.033 mi. Franklin Co., fro R. J. Dienst 297 S. High St., Columb **$54,600,** est. $63,420***2.674 mi. Ashtabu Co., from Koski Const. Co., National Ba Bldg., Ashtabula, **$65,520,** est. $68,530* 1.237 mi. Trumbull Co. from Ohio Ro Improvement Co., 30 E. Broad St., Columb Zone 15, **$26,118,** est. $26,500***24.016 m Paulding and Defiance Counties, from J. Harper, Napoleon, **$61,472,** est. $65,800* 7.929 mi. Lorain Co., from Ohio Engineeri Co., Lorain, **$77,889,** est. $105,000***2.002 m Guernsey and Noble Counties, from Fent Const. Co., Box 445, Ashland, **$39,589,** e $41,200***30.06 mi. Butler and Hamilt Counties, from Walter L. Follmer Co., P. Box 173, Hamilton, **$60,628,** est. $60.963* 0.463 mi. Warren Co., from O'Connell Sweeney, Inc., Kellogg and Tennyson S Cincinnati, **$46,663.** Received no bids Se 12. imprv. 5.345. Muskingum Co., 0.987 m Clinton Co., 0.822 mi. Champaign Co., 1. mi. Allen Co. CD 8/31—ENR 9/7.

The four Hemispheroids in the large view at the top of this page are located at an oil recycling plant in the Southwest. Two of them have a capacity of 10,000 bbls. each and the other two hold 20,000 bbls. each. They are all designed to operate at 5 lbs. per sq. in. pressure. The cone-bottom bin in the illustration directly above is used to store 5,000 cu. ft. of dry lime at a Southern paper mill.

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Tulsa 3......................1617 Hunt Bldg.
Birmingham 1......1520 North Fiftieth Street
Washington 5..............330 Bowen Bldg.
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San Francisco 5............1020 Rialto Bldg.

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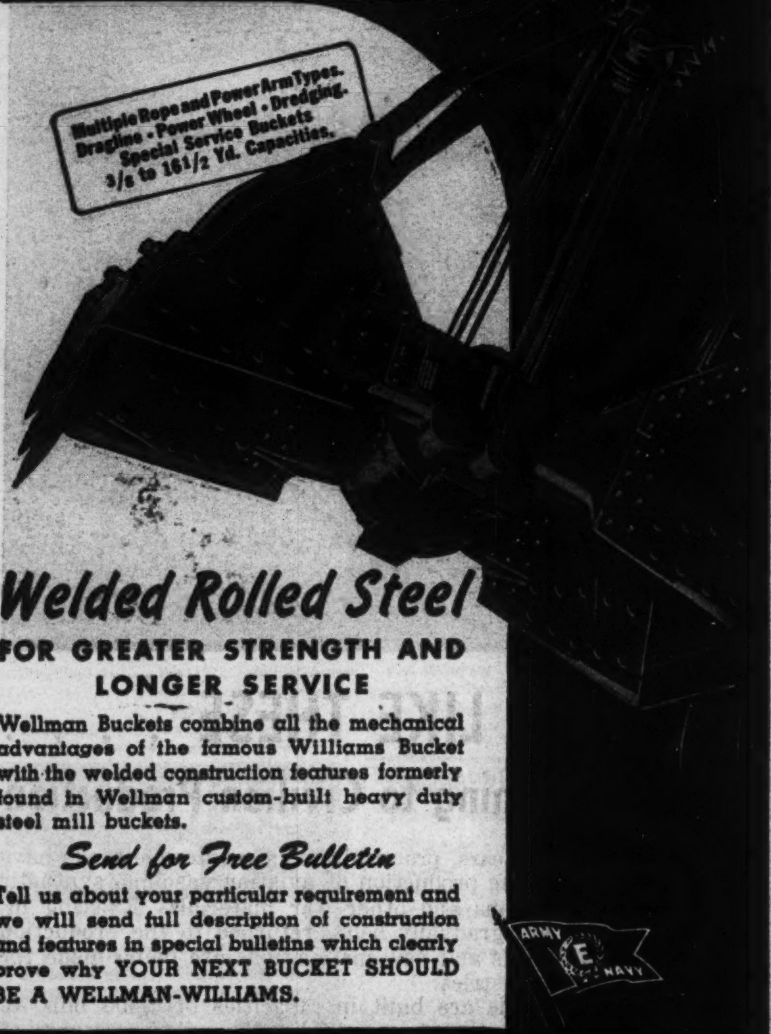

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STREETS AND ROADS (Low Bidde
Contd.)

Pa., Pittsburgh—City, Dpt. P. Wks., F.
Roessing, dir., City County Bldg., appr
120,000 sq. asphaltic surface course resurfa
ing approx. 120,000 sq. yd., from Alleghe
Asphalt & Paving Co., 411 Blvd. of Alli
$155,285. C. H. Barrett, City County Bld
city engr.

Pennsylvania — State Dpt. Hys., Harr
burg, Sept. 12, imprv. 0.69 mi. Northumb
land Co., from F. M. Rhodes, Jr., Readi
$39,739; 0.82 mi. Indiana Co., from Char
Engelman trading as Engelman Exc. C
Rochester Mills, **$117,170.** CD 9/5—ENR 9

★**Texas**—State Hy. Dpt., Austin, Sept.
imprv. 8.402 mi. Nacogdoches Co., fr
Texas Bitulithic Co., Box 5297, Dallas, a
Ben Sira & Co., 3901 Elm St., Dallas, **$4**
557***6.931 mi. Wise and Tarrant Count
from Austin Road Co., 1813 Clarence
Dallas, **$305,231*****13.595 mi. Coryell a
Bell Counties, from Public Constr. C
Denton, **$172,578*****7.528 mi. Freestone C
from McKinney Constr. Co., Marshall, **$**
513***10.621 mi. Harris Co., from G
Bitulithic Co., Box 2096, Houston, **$145,**
CD 9/6.

Virginia—Dpt. Hys., Richmond, Sept.
imprv. 0.203 mi. Shenandoah Co., fr
Echols Bros., Inc., Staunton, **$53,261.**
9/7.

CONTRACTS AWARDED

Miss., Greenville—City, E. M. Gray, may
paving parts Alexander, Euicha, Cedar,
Allister, Gulf and Lotus Sts., to Burd
Constr. Co., Greenville, **$68,373.** Bids 8/
CD 8/16—ENR 8/24.

New Mexico—At office F. G. Healy, st
hy. engr., Santa Fe, imprv. 40.7 mi. S
Miguel Co., to Hayner & Burn, Las Cruc
$42,284. Bids 9/15. CD 9/6.

Oklahoma—State Hy. Dpt., Oklahoma Ci
grading, concrete paving 20.034 mi. G
Blvd. Rd. from city limits of Lawton, no
to Fort Sill Reservation, Comanche Co.,
Standard Paving Co., 2119 E. 11 St., Tu
$149,907. Est. $139,826. Bids 9/7, award
9/12. H. E. Baily, Oklahoma City engr.

†**Oregon**—Public Rds. Admin., 316 N
Post Office Bldg., Portland, construct
Deadwood timber access road in Ashla
Medford Area, Jackson Co., to Morris
Knudsen Co., 319 Bway., Boise, Idaho, **$**
783. Awarded 9/12.

Oregon—State Hy. Comn., Salem, 12,600
yd. crushed gravel in stockpiles Nimr
Alder Springs Rock production project,
McKenzie Hy., Lane Co., to Newport, K
& Kibbe, 7031 N. E. Halsey St., Portla
$30,600. Bids and awarded 9/11.

†**Ore., Portland**—U. S. Eng., 628 Pitt
Block, SW 10 Ave. and Washington
Portland, access road and appurtenant w
at Portland sub-port of embarkation,
Parker-Schramm, 515 Couch Bldg., **$29,**
Awarded 9/8.

Tex., Houston—City, asphalt paving Bri
hurst, Bear and Center Sts., to Brown
Root, Box 3, **$34,465.** F. Harrell, asst. c
engr.

Wyoming—State Hy. Dpt., Cheyenne, i
prv. 1.539 mi. Sheridan Co., to Big H
Constr. Co., Sheridan, **$49,242.** Bids a
awarded 9/12. CD 9/1.

EARTHWORK, WATERWAYS

PROPOSED WORK

†**Idaho**—U. S. Eng., 628 Pittock Blo
S.W. 10 Ave. and Washington St., Portla
Ore., flood control work along Snake Riv
$100,000; along Boise River, $200,000.

Wash., Bellingham—Port of Bellingh
300 ft. stone breakwater exten. $50,000.

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EARTHWORK, WATERWAYS (Cont'd.)

Bids Asked September 29

†**Tenn., Memphis**—U. S. Eng., P. O. Box 97, Zone 1, approx. 1,275 in. ft. pile dike in Mississippi River at Vice President's Island, approx. 730 mi. above Head of Passes, near here.

Bids Asked September 30

†**Montana**—Bureau Reclamation, Dpt. Interior, Fairfield, constructing Sun River crossing, Pishkun Canal, Station 40 plus 12, Sun River Project, 18 mi. northwest of Augusta, Spec. 1771-D. W. R. Young, acting ch. engr.

Bids Asked October 5

†**Neb., Hemingford** — At office, Bureau Reclamation, Dpt. Interior, W. R. Young, acting ch. engr., Denver, Colo., furnishing, del. in stockpiles approx. 1,450 tons sand and 2,300 tons coarse aggregate for Box Butte Dam, Mirage Flats Project, Spec. 1773-D.

Bids Asked October 7

†**Oregon-Idaho**—Bureau Reclamation, Dpt. Interior, W. R. Young, acting ch. engr., Boise, Idaho, sealed asphaltic-concrete lining North Canal, station 2282 plus 83 to station 2302 plus 83, North Canal lateral 43.2, station 0 plus 50 to station 10 plus 50, Dead Ox Flat Div., Owyhee Project, Oregon and Idaho, near Ontario, Ore., Spec. No. 1768-D.

Bids Asked October 10

†**Arizona**—Bureau Reclamation, Federal Bldg., farm laterals and land leveling, Yuma Mesa predevelopment, Yuma Mesa Div., Gila Proj., Spec. 1‑72-D. W. R. Young, acting ch. engr.

Bids Asked October 13

†**New Mexico**—Bureau Reclamation, Dpt. Interior, W. R. Young, acting ch. engr., Denver, Colo., furnishing, del. f.o.b. cars at shipping point or f.o.b. cars Tucumcari, one 16 ft. x 9 ft. and one 12 ft. x 9 ft. radial gates with rollers, pin-bearings, wall plates, and accessories for both gates, with one 8 in. gate sill for 12 x 9 ft. gate only, two 5,000 lb. cap., manually operated, radial-gate hoists, complete with accessories for installation in check and wasteway in Conchas Canal, at Station 812 plus 57, Tucumcari Project, Spec. 1770-D.

Bids Asked October 14

†**Oregon**—Bureau Reclamation, Dpt. Interior, W. R. Young, acting ch. engr., Bend, earthwork, structures, county bridges at stations 180 plus 42, 1382 plus 00, and 1411 plus 10, operating bridge at station 1315 plus 00, and farm flumes at stations 180 plus 95 and 1382 plus 30, North Unit Main Canal, Deschutes Project, near Bend, Redmond and Terrebone, Spec. No. 1769-D.

LOW BIDDERS

Illinois—Illinois Div. Waterways, 201 W. Monroe St., Springfield, Sept. 14, rein.-con. trash rack with all necessary appurtenances in main drainage ditch of Hillview Drainage and Levee Dist., Hillview, Green and Scott Counties, from Sangamo Constr. Co., 700 N. MacArthur St., Springfield, **$37,435.**

Ill., Peoria—Greater Peoria Sanitary & Sewage Disposal Dist., foot of Darst St., Sept. 12, raising, strengthening earth levee for constructing riprap stone paving, etc., from Herkel & Day, West Chicago, **$30,878.** CD 8/8—ENR 8/10.

†**Louisiana**—U. S. Eng., foot of Prytania St., Sept. 9, approx. 1,500,000 cu.yd. compacted earthwork, etc., Item R 278.7, Morganza Levee, Atchafalaya Levee Dist., Pointe Coupee Parish, Mississippi River Levees, Solic. No. 16-047-45-9; from McWilliams Dredging Co., Hibernia Bldg., New Orleans, hydraulic method **25.91c.** per cu.yd. CD 8/31.

†**La., New Orleans** — U. S. Eng., foot of Prytania St., 6,680 squares 100 sq. ft., asphalt or concrete levee slope paving work, excav., etc., Sol. No. 16-047-45-7, from T. W. Kleinpeter, 4047 Hatcher Dr., **$130,840.**

†**Massachusetts and New Hampshire**—U. S. Eng., 819 Industrial Trust Bldg., Providence, R. I., Sept. 9, exploratory borings at Charlton and West Brookfield, Mass., and Honey Hill and North Canaan, N. H., from Sprague & Henwood, Inc., Box 446, Scranton, Pa., **$18,920.**

O., Cleveland—City, City Hall, Sept. 8, bulkhead, jetties along Lake Erie at W. 103 St., near Edgewater Beach, from R. W. Walton, 1357 West Blvd., **$110,400.** CD 8/29—ENR 8/31.

†**Washington**—Bureau Reclamation, S. O. Harper, ch. engr., Denver, Colo., Sept. 7, furnishing 2-leaf miter gate for drydock at Grand Coulee Dam, from Lehigh Structural Steel Co., Lehigh, Pa., **$48,900.** CD 8/14—ENR 8/17.

CONTRACTS AWARDED

†**Louisiana**—U. S. Eng., foot of Prytania St., New Orleans, approx. 72,500 cu. yd. earthwork on Mississippi River Levee, Solic. No. 16-047-45-6, Jefferson and Plaquemines Parishes, to J. P. Cross, Abbeville, **$47,125.** Bids 8/29. CD 8/16.

★ †**Michigan**—U. S. Eng., P. O. Box 2859, 700 Union Guardian Bldg., Detroit, Zone 31, retaining wall at Saulte Ste. Marie Lock, to Sunswick Corp., 10 E. 40 St., New York, N. Y. Est. **$1,000,000.** Bids 9/11.

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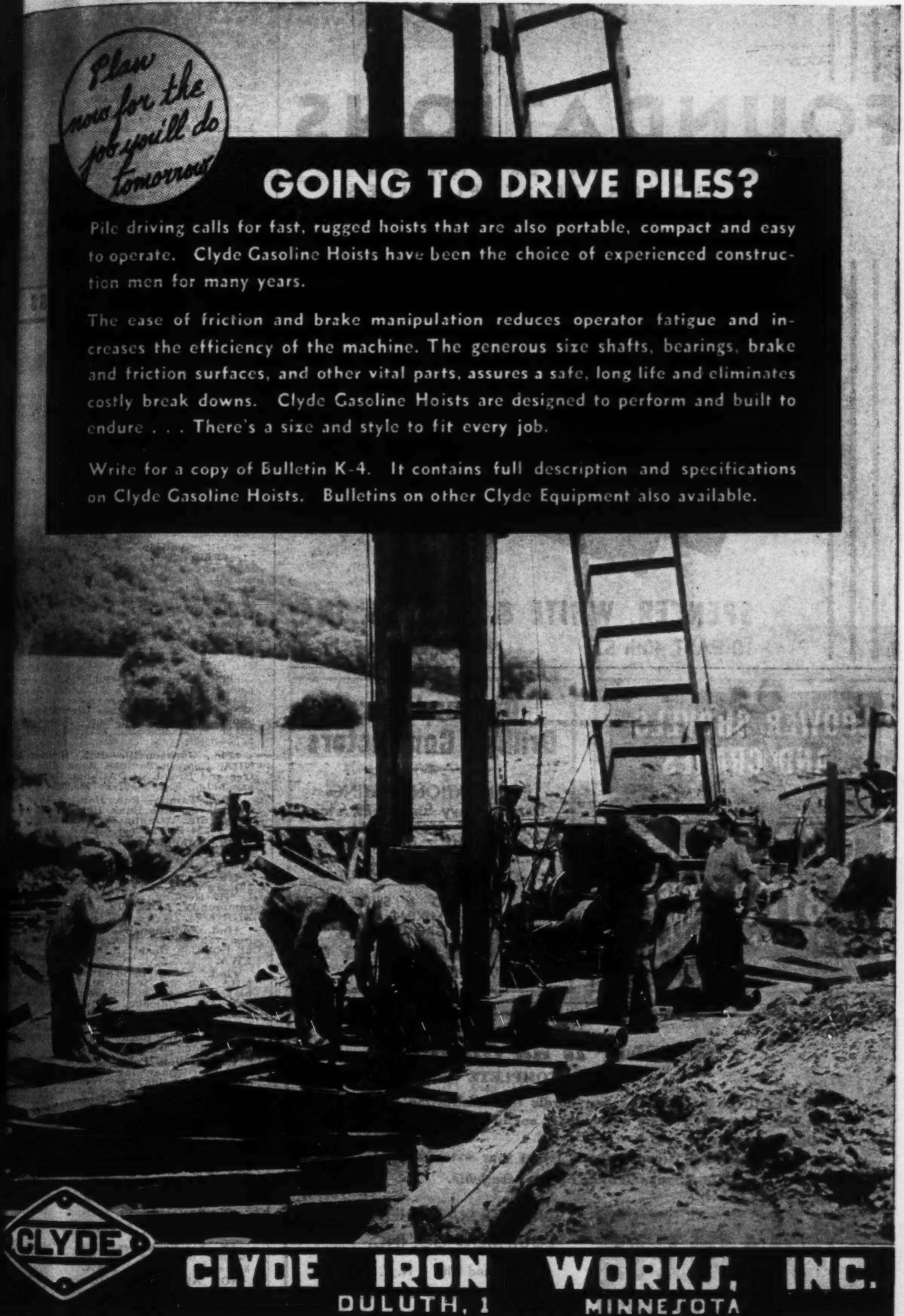
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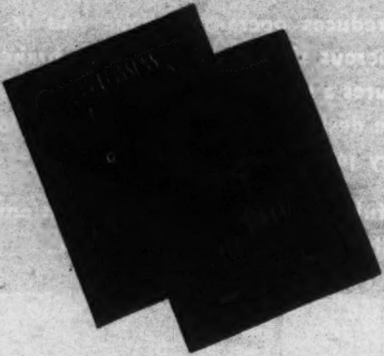

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EARTHWORK, WATERWAYS (Contra Awarded, Cont'd.)

†Oregon—U. S. Eng., 628 Pittock Bl S.W. 10 Ave. and Washington St., Portla revetment work along Willamette and Kenzie Rivers in locations A, F, G and (Inv. 986), near Eugene and Harrisbu Lane Co., to Oscar Butler & Son, 4910 N 42 St., Portland, $63,130; along Santi River, locations L and M, between Jeffer and mouth of river, Jefferson Co., to Leon & Slate, 7804 S.W. 40 St., Portland, $44, Awarded 9/8.

†Texas—U. S. Eng., 25 St. and Avenue Galveston, dredging 484,000 cu. yd. materi for distance 18,200 lin. ft. from Cedar Bay Chambers and Harris Counties, to Jahne Service, Inc., 814 Howard Ave., New Orlea La., 6.17c. per cu. yd. CD 9/12—ENR 9/

†Tex., Athens—U. S. Eng., 231 W. M St., Denison, 330,000 cu.yd. embankme gates, pipe, etc., Sol. 41-242-45-18, to Sp cer Constr. Co., Carrollton, approx. $46, CD 8/15.

PUBLIC BUILDINGS

PROPOSED WORK

†Calif., Azusa—Aerojet Engineering Co Pasadena, addnl. plant bldgs. $55,000. fense Plant Corp. will finance.

†Calif., Martinez—Federal Works Agen 2223 Fulton St., Berkeley, Zone 1, rejec bids Aug. 30, nursery school. Calif. 4-607 CD 8/18.

★**†Calif., Richmond**—Housing Auth. City of Richmond, C. F. Strothoff, ex dir., Commercial and Ohio Sts., remodel and fire-safing 10,000 U. S. Maritime ho ing units and 19 dormitory bldgs., in Cutti Blvd., Ohio and Commercial Sts. proje $1,315,000. CD 4/14—ENR 4/20.

†Calif., San Diego—Pub. Housing Au NHA, 785 Market St., San Francisco, family trailers, Calif. 4884.

†Calif., Vallejo—Federal Works Age 2223 Fulton St., Berkeley, Zone 1, rejec bids Sept. 8, 4 nursery schools, 2 at Flo School, 1 each at Solano and Carqui Schools, Calif. 4-632-F. Will readverti D. H. Horn, Claremont Hotel, Berke archt. CD 8/22—ENR 8/24.

†Conn., Fairfield—Pub. Housing Au NHA, 24 School St., Boston, Mass., sew disposal plant, Melville Ave. Proj., Co 6071. Fletcher Thompson, Inc., 211 St St., Bridgeport, engr.

†Fla., Jacksonville—Bd. Public Instruct Duval Co., bids soon 31 addnl. classroo and 1 general purpose room to Duval School bldgs. at Fletcher High School, No Shore, Thomas Jefferson, Wescomett River View Schools. $278,000. **FWA.** 8/18—ENR 8/24.

†Fla., Jacksonville—Pub. Housing Au NHA, Georgia Savings Bank Bldg., Pea tree and Broad Sts., Atlanta, Ga., war n ery bldg., Fla. 8-327-F. $35,000. **FWA.**

†Fla., Tampa—Pub. Housing Auth., NH Georgia Savings Bank Bldg., Peachtree Broad Sts., Atlanta, Ga., war nursery bl Fla. 8-324-F. $46,000. **FWA.**

†Ill., Moline—Lutheran Hospital, 5 Ave., 1 story, laundry addn., Ill. 11-32 $41,400. **FWA.**

†Ill., Seneca—Pub. Housing Auth., NH 201 N. Wells St., Chicago, Zone 6, plans L. H. Gerding, 708 La Salle St., Otta community bldg., Ill. 11216. CD 8/ ENR 9/7.

†Ind., Indianapolis—City, altering, rep ing, remodeling 3 separate adjacent bl at Isolation Hospital Ind. 12-219-N. $93, **FWA.**

†Ind., South Bend—Pub. Housing Au NHA, 201 N. Wells St., Chicago, 6, plans by Loebl & Schlossman, 333 N. Mi gan Ave., Chicago, Ill., community Bl Ind. 12188.

†Me., Portland—Pub. Housing Auth., NH 24 School St., Boston, 8, Mass., commu bldg. addn., Me. 17033.

†Md., Sollers Point—Comrs. Baltimore Towson, dismantling, moving from Dub Va., remodeling, re-erecting here, fra dormitory bldg. to provide war nursery c ter for 97 preschool children, Md. 18-22 $37,000. **FWA.**

†Mass., Canton—Plymouth Rubber Inc., Canton, addnl. plant facilities. $150, Defense Plant Corp. will finance.

†Mass., South Boston (sta. Boston)—C ney Hospital, Old Harbor, 1 story bldg. house science and dietetic laboratories nurse's training, at Carney Hospital, M 19-195-N. $17,840. **FWA.**

†N. J., Dover—U. S. Eng., 120 Wall New York, 5, N. Y., 7 miscellaneous bld Picatinny Arsenal. $200,000.

†N. Y., Rochester—City, altering, im School Bldg. 12, for war nursery, N. 30-288-N. $13,800. **FWA.**

†O., Akron—Pub. Housing Auth., NH 2073 E. 9 St., Cleveland, Zone 15, plans E. D. Wagner, 200 Permanent Bldg., unit single person housing, Ohio CD 8/24—ENR 8/31.

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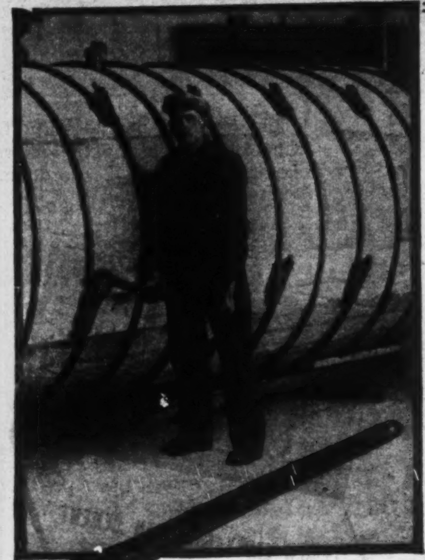

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1869 *Serving the Construction Industry for 75 Years* 1944

PUBLIC BUILDINGS (Proposed W
Cont'd.)

O., Damascus—Goshen Bd. Educ., H.
Stanley, clk., bond election Nov. 7, h
and grade school addn. $150,000. O.
Kling, 100 E. Rayne St., Youngstown, ar

Ore., Klamath Falls—City of Klam
Falls and Klamath Co., plans by H. Per
1121 Main St., 1 story, rein.-con. joint C
County jail. $160,000. Applied to F
C. E. Stewart, Spalding Bldg., Portla
engr.

Ore., Roseburg—Mercy Hospital, Roseb
plans by F. B. Jacobberger, McKay Bl
Portland, Mercy Hospital addn. $156,
Applied to FWA.

★ †**Pa., Bruceton**—Bureau of Mines, H.
Greenwald, constr. supt., 4800 Forbes
Pittsburgh, preliminary sketches by Pr
& Prack, engrs.-archts., 517 Martin Bl
Pittsburgh, reinforced steel research
development laboratory for synthetic liq
fuels. $1,500,000. CD 9/15.

Pa., Morrisville—Commonwealth of Pe
sylvania, c/o A. J. Warlow, Harrisbu
plans by Del. River Nav. Com., Morrisv
cement brick maritime academy. $150,

Pa., Pottsville—Pottsville Hospital, Ma
Chunk and Jackson Sts., plans by T.
Ellerbe, 1st Natl. Bank, St. Paul, Mi
hospital addn.

†**Tenn., Columbia**—Pub. Housing Au
NHA, Georgia Savings Bank Bldg., Pea
tree, and Broad Sts., Atlanta, 3, Ga.,
homes. $150,000.

†**Tex., McGregor**—Pub. Housing Au
NHA, 1205 Electric Bldg., 7 and Taylor
Fort Worth, Zone 2, plans by Clark
Pelich, Geren & Rady, Insurance Bldg.,
Worth, 125 portable shelter units, Tex. 41
CD 9/6—ENR 9/14.

Tex., Sweeney—Ind. School Dist.
Sweeney, plans by A. B. Dow, Inc.,
Commerce Bldg., Houston, 1 story, br
rein.-con. school. $150,000.

†**Wash., Auburn**—Auburn School Dist.
King Co., Unit 1, Junior High School a
and Unit 2, school, Wash. 45-302-N. $120,
FWA.

★ **Alta., Edmonton**—Dpt. P. Wks., Otta
Ont., plans by MacDonald & Magoon,
Tegler Bldg., 5 story, bsmnt., granite,
federal bldg., 100 St. $500,000.

★ **New Brunswick**—Dominion Govt., Otta
Ont., plans by Veterans Rehabilita
Dpt., Dpt. Pensions & National Hea
Ottawa, Ont., 200 homes. $900,000.

BIDS ASKED

Bids Asked After September 15

†**N. Y., Syracuse**—Bd. Trustees Syrac
University, laboratory and classroom bl
N. Y. 30-284-N. $50,000. FWA. Egger
Higgins, 542 5 Ave., New York, Zone
archts. CD 7/11—ENR 7/13.

Va., Williamsburg — Supt. Bldgs.
Grounds, College of William & Mary, W
liamsburg, heat distr. sys. *$300,000. Wi
& Wilson, Peoples Bank Bldg., Lynchb
archts.

Bids Asked After September 19

†**Md., Cumberland**—Allegheny Hospi
cadet nurses' dormitory, classroom bl
FWA. S. Russ Minter, 1st Natl. B
Bldg., archt.

Bids Asked September 27

†**Kan., Kansas City**—Douglas Hospital,
F. E. Kitchen, supt., 27 and Grant St.,
modeling hospital, Kan. 14-254. $160,
FWA. Bloomgarten & Frohwerk, 612
delity Bldg., 9 and Walnut Sts., Kan
City, Mo., archts. CD 9/6—ENR 9/14.

Bids Asked September 28

†**Wash., Vancouver**—Clark County Sch
Bd., 23 and Kauffman Sts., Fourth Pla
School, No. Wash. 45-290-N. FWA. Pl
deposit $25. D. Steward, 222 Central Bl
archt. CD 8/11.

Bids Asked October 2

Ind., Gary—Mrs. Frankie Helman, tru
Calument Twp., Lake County Court Ho
401 Bway., 1 story, bsmnt., concrete bl
rein.-con. Junior High School. $150,
Plans deposit $20. J. H. Wildermuth,
Bway., archt. CD 7/6—ENR 7/13.

Bids Asked October 3

†**Ga., Columbus**—City of Columbus Ho
ing Auth., 1100 27 St., 160 family dwell
units and community bldgs., for War
Williams homes, Ga. 4-5, for NHA. Pl
deposit $50. Lockwood & Biggers, Mur
Bldg., archts. CD 4/10—ENR 4/13.

Bids Asked October 3

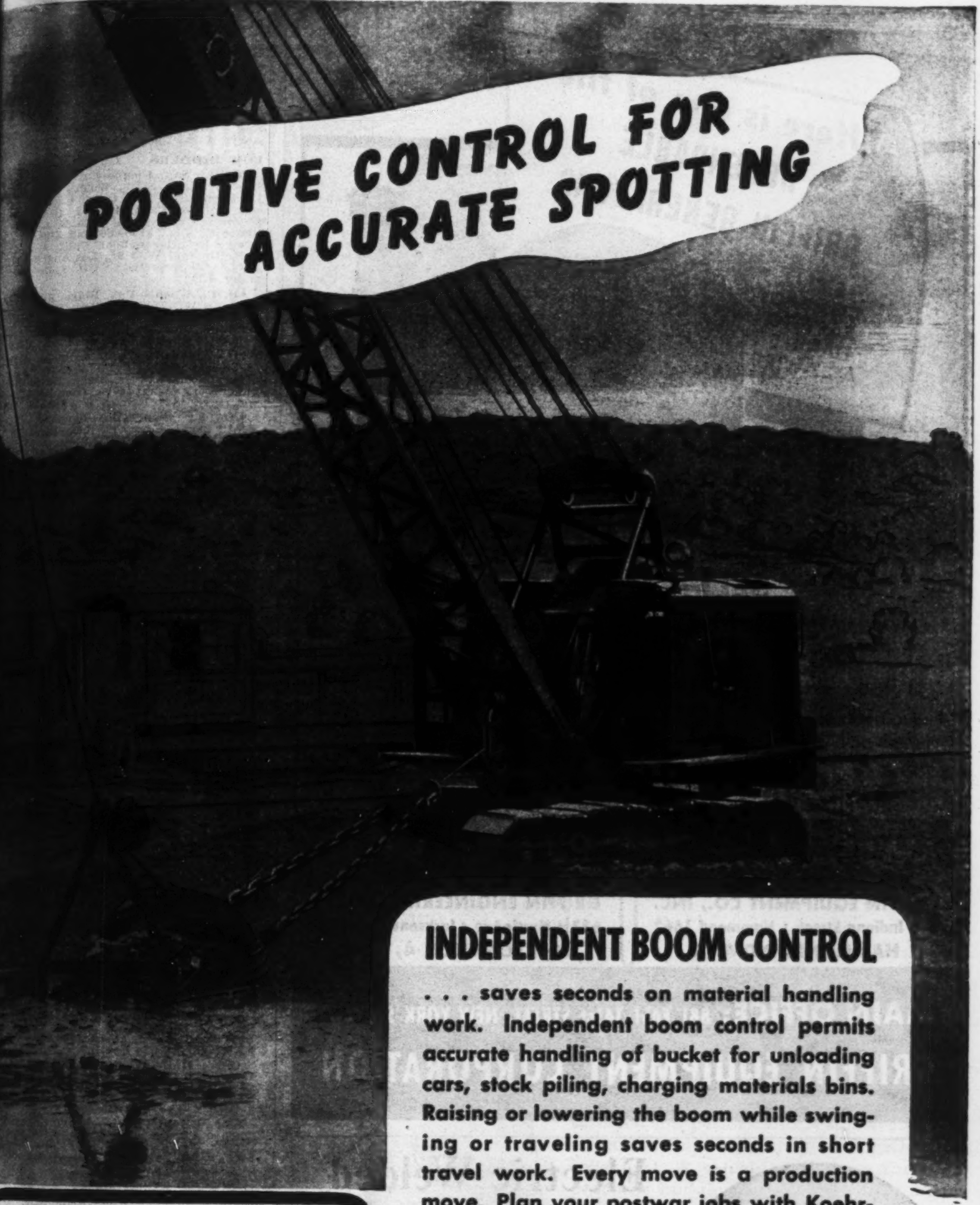
†**Ga., Savannah**—Pub. Bldgs. Admin.,
and F Sts. N.W., Wash., 25, D. C., exter
painting and miscellaneous repairs, U.
Post Office & Court House.

Bids Asked October 6

†**Ga., Marietta**—Pub. Bldgs. Admin.,
and F Sts. N.W., Wash., 25, D. C., sch
bldg., Ga. 9-302-F. FWA. Tentative d
R. R. Nash, Mozely Bldg., archt. CD 9/1
ENR 11/14.

Bids Asked October 10

†**Kan., Kansas City**—Providence Hospi
18 and Tauromee Sts., c/o Sisters of Char
Mother M. Francesca, pres., 18 and Tau
mee Sts., hospital expansion, Kan. 14-
$275,000. FWA. Carroll & Dean, 1220 R.
Long Bldg., Kansas City, Mo., archts.
9/6—ENR 9/14.



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PUBIC BUILDINGS (Bids Asked, Cont'd

Bids Asked About October 16

†Fla., Panama City—City, constructing
bed hospital. **$400,000.** FWA. Smith
Gillespie, Packard Bldg., Jacksonville, Z
2, engrs.

Bids Asked

†Md., Aberdeen Proving Ground—U.
Eng., Standard Oil Bldg., Baltimore,
story, X-ray bldg., brick, concrete.

LOW BIDDERS

†Calif., San Diego—Pub. Bldgs. Admi
18 and F Sts. N.W., Wash., 25, D. C., Se
15, Barnard School, Calif. 4-585-3, and Mi
way School, Calif. 4-584-2, from Shuma
& Evans Constr. Co., 3000 N. Central Av
Phoenix, Aliz., **$166,666** and **$194,642** resp
tively; Frontier School, Calif. 4-584-1, fr
J. Keith, 8517 W. 3 St., Los Angeles, **$175,**
Bids 8/29 rejected. CD 8/31—ENR 9
under LB.

†D. C., Wash.—Pub. Bldgs. Admin., 18 a
F Sts. N.W., Zone 25, Sept. 15, dormitory
Langston Stadium, D.C. 49102, from Jo
McShain, Inc., 16 St. N. and N. Arling
Bridge, Arlington, Va., **$348,200.** CD 9/11

†D. C., Wash.—Yards & Docks, Navy D
18 St. and Constitution Ave. N.W., Zone
Sept. 11, explosives bldg., Naval Resea
Laboratory, NOY 10455, from John Tester
Son, Inc., 1427 I St. N.W., **$49,548.** CD 9

†N. J., Somerville—Somerset Hospi
Rehill Ave., Sept. 12, hospital addn., N
28-177-N, from J. N. Wester, 320 Am
Ave., Metuchen, **$415,659.** FWA. CD 9/
ENR 9/7.

★**†Wis., Merrimac**—U. S. Eng., 408 Fede
Bldg., Milwaukee, Sept. 7, barricades
Badger Ordnance Plant, from Graham P
ing & Constr. Co., 30 N. La Salle St., Chica
Ill., **$645,838;** Sept. 11, flooring at ab
plant, from Melville Corp., 737 N. Michi
Ave., Chicago, Ill., **$69,241.** Hercules Pow
Co., 908 Market St., Wilmington, Del.,
operate. Mason & Hanger Co., 500 5 A
New York, N. Y., engrs.-archts.

B. C., Vancouver—Provincial Govt., V
toria, 2 story, part bsmnt., 35x228 ft., re
con. hospital, from Coast Constr. Co., L
704 Standard Bank Bldg., **$141,270.**
Whittaker, Parliament Bldgs., Victo
archt.

CONTRACTS AWARDED

Mich., Bay City—Bay City General Ho
tal, general contract, brick, steel, concr
hospital addns., alterations, to Engel
Constr. Co., 404 Shearer Bldg., appr
$150,000. Bids 8/15. CD 8/7—ENR 8/1

†Mich., Detroit—Westinghouse Electric
Mfg. Co., Detroit, Naval Ordnance Pla
23500 Mound Rd., brick, steel, concrete pl
addn., to Bryant & Detwiler Co., 2304 Pe
scot Bldg. Est. approx. **$100,000.** Federa
financed. Albert Kahn Associated Arc
tects and Engineers, Inc., 345 New Ce
Bldg., Detroit, 2, archts.

★**†Va., Williamsburg**—Yards & Doc
Navy Dpt., 18 St. and Constitution A
N.W., Wash., 25, D. C., storehouse, shed
storage bldg., Naval Supply Depot, Cheath
Annex, NOY 9708, to Virginia Engrg. C
Inc., Melson Bldg., Newport News, **$2,470,**
Bids 9/7. CD 9/11—ENR 8/10, under LB

Ont., Sarnia—Wartime Housing, Ltd.,
York St., Toronto, 50 soldiers' houses,
Russell Const. Co., Ltd., 501 Harbour Co
missioners Bldg., Toronto, about **$150,**
$175,000. CD 9/6.

★**Ont., Sarnia**—Wartime Housing, Ltd.,
York St., Toronto, 200 houses on exte
sion of Cromwell St. from Russell to
Sts., to L. C. Scott Const. Co., Ltd.,
Bay St., Toronto, about **$700,000.** CD 6/3
ENR 7/8.

Que., Hull—Wartime Housing, Ltd.,
Yonge St., Toronto, Ont., 50 addnl. hou
to Clark-Francis, Ltd., Whitewood A
New Liskeard, Ont., about **$175,000.** CD 7/
—ENR 7/13.

Que., Mont Louis—Province of Queb
Quebec City, cold storage warehouse, to
Giroux, 7 Notre Dame St., St. Casmir
$40,000. Dpt. Game & Fisheries, Quebec Ci
archts. CD 5/10.

Que., St. Bonaventure—Province of Q
bec, Quebec City, cold storage warehou
to A. Bugold, Rue Principale, Ruis
Blanc, Est. **$40,000.** Dpt. Game & Fisheri
Quebec City, archts.

COMMERCIAL BUILDING

PROPOSED WORK

Ind., Indianapolis—Hall-Hottel Co., In
E. Ohio St., plans by L. F. Ayres, en
archt., Architects and Builders Bldg., gr
2 apartment brick dwellings. $175,000.

★**O., Cleveland**—Mt. Sinai Hospital,
H. L. Rockwell, dir., 1800 E. 105 St.,
story, brick, rein.-con. hospital ad
$500,000.

O., Cleveland Heights—A. J. Humm
4091 Meadowbrook Blvd., Cleveland, revi
plans by Wm. J. Bingham, Chillicothe
Kirtland, 3 story, bsmnt., 30x185 ft., br
apartment. **$150,000.** CD 10/25—E
10/28, under CA.

A. C. Airplane Repair Shop, Brookley Field, Mobile, Ala.

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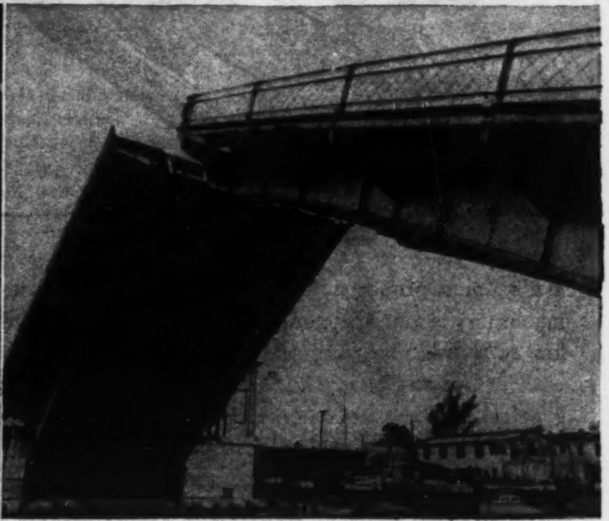
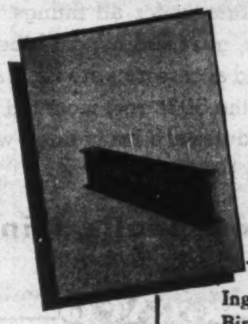
WITH STEEL



r Stadium, Duke University, Durham, N. C.

Second Avenue Bridge over Miami River, Miami, Fla.

INGALLS
STEEL



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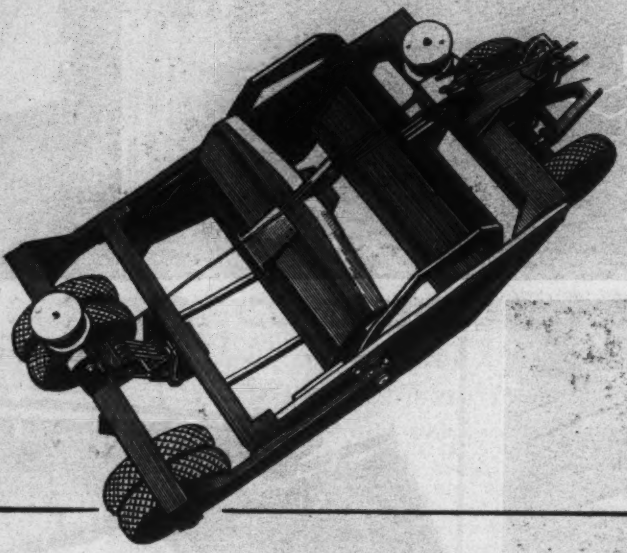

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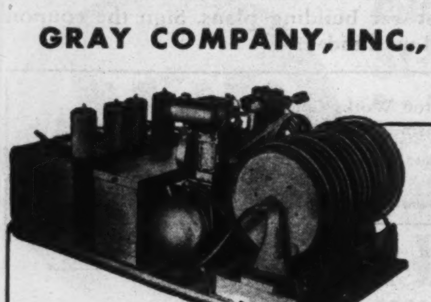

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COMMERCIAL BLDGS. (Proposed W
Cont'd.)

★ **Ont., Ottawa**—Recreational Assn. of
tawa, c/o M. E. Kenny, R. A. B
Rideau St., preparing plans, theatre,
$740,000; outdoor swimming pool center,
000; indoor sports centre, incl. gymnas
basketball, badminton, tennis accomodat
etc., $280,000; outdoor sports centre,
athletic field for track, etc., stadium,
Ottawa West, $170,000.

Que., Montreal—Reverend Sisters of Ch
ity (Grey Nuns) 197 Ste. Catherine St.
Ophtalmique Hospital. $150,000.

CONTRACTS AWARDED

★ **N. J. Union**—Consolidated Const. Co.,
Pomona Ave., Newark, 2 story, fr
brick veneer garden apartment, Magie A
near Galloping Hill Rd., separate contr
$500,000. McMurray & Schmidlin, 968 S
vesant Ave., archts. CD 8/8—ENR 8/10.

La., New Orleans — International Ho
New Orleans, altering bldg. Camp
Gravier Sts., to G. F. Favrot, Balter B
$170,486. CD 8/16—ENR 8/24.

Pa., New Kensington—Citizens Gen
Hospital, L. C. French, supt., New Kens
ton, 1½ story, 68x68 ft., brick, concr
rein.-con. boiler house and laundry bldg.
Helvenston Const. Co., 4828 Liberty A
P. O. Box 9093, Pittsburgh, Zone
$60,750. Bids 9/11. CD 8/31—ENR 9/7.

INDUSTRIAL BUILDINGS

PROPOSED WORK

Ark., Lake Village—SUB-STATION—
kansas Power & Light Co., Pine Bluff,
station. $100,000.

Colo., Denver — PLANT — Union Pa
System, B. H. Prater, ch. engr., 1416 Do
St., Omaha, Neb., soon lets contract 1 st
133x160 ft. hollow tile or brick plant. $65,
Roland L. Linder, Insurance Bldg., ar
B. K. Sweeney Electrical Co., 1601 28
lessee. CD 8/15—ENR 8/17.

N. J., Hillside—PLANT—Electric Fixt
Mfg. Co., 2 Garden St., Newark, plans
Wm. Lehman, 972 Broad St., Newark
story, brick, mfg. bldg., Chestnut St. $42,

Ind., Whiteland — CANNERY — Stok
Bros. & Co., Merchants Bank Bldg., I
anapolis, rebuilding cannery. $60,000
more with equip.

Kan., Independence—COMPRESSOR S
TION—Cities Service Gas Co., Southeast
City, Oklahoma City, Okla., imprv., ex
compressor station near here. $250,000.

Kan., Iola—COMPRESSOR STATIO
Cities Service Gas Co., Southeast of City, O
homa City, Okla., expan., imprv. compr
station (Petrolia), near here. $200,000.

La., Logansport—DEHYDRATION PLA
—Southern Natural Gas Co., Watts B
Birmingham, Ala., imprv. dehydration p
incl. gas scrubber unit addn. $60,000.

★ **Mich., Detroit** — PLANT — United St
Rubber Co., 6600 Jefferson Ave., 4 st
bsmnt., 174x180 ft., 3 story, 86x165 ft., p
addns., for production high flotation t
$3,015,775.

Minn., St. Louis Park—WAREHOU
American Refrigerator & Machine, Inc.,
N. 3 St., Minneapolis, plans by Lan
Raugland, 502 Wesley Temple Bldg.,
neapolis, 1 story, 120 x 220 ft., conc
block walls, steel I-beam warehouse.
000.

N. Y., Ballston Spa—PLANT—Amer
Hide & Leather Co., Inc., at office Ke
Holroyd, consult. engrs., 257 Bway., T
rejected bids Aug. 28, factory addn.
8/16—ENR 8/24.

O., Toledo—FACTORY—Willys-Overl
Motors, Inc., Wolcot Bldg., factory alt
tions. $66,562.

Ore., Drain—MILL—Whipple Mill
Drain, sawmill. $75,000.

Ore., Roseburg—SHOP—Dillard Motor
Roseburg, auto repair shop. $61,000.

Pa., Bridgewater—BAKERY—Keyst
Bakery, Inc., L. H. Braum, pres., Ma
St., plans by W. E. Long Co., 155 N. C
St., Chicago, Ill., 2 story, 40x125 ft.,
brick bakery addn. $40,000.

Pa., York—FACTORY, etc.—Alloy
Mfg. Co., 501 Prospect St., bids soon, b
steel factory, laboratory and offices. $75,

R. I., Phillipsdale—FACTORY—Gantea
& McMullen, engrs., 99 Chauncy St., Bo
Mass., brick factory addn., for Bird &
Inc., Phillipsdale. Over $40,000.

Tex., Edinburg—CREAMERY—W. B.
thews, 2419 W. 10 St., Dallas, 1 story, b
rein.-con., etc. creamery plant. $40,00

Tex., Fort Worth — PLANT — Hobbs
Co., 609 N. Main St., rejected bids Aug.
200x300 ft. mfg. plant. $175,000. C. H. P
& Son, P. O. Box 936, Austin, archts
8/22—ENR 8/24, under LB.

Tex., Texas City—PLANT—Tin Proce
Corp., Texas City, expan., imprv. plant
000. Rob. J. Cummins, Bankers Mtg. B
Houston. $40,000.

USTRIAL BLDGS. (Proposed Work, ont'd.)

is., Beloit—FACTORY—C-Z Chemical 1447 Argall St., plans by C. E. Wolfley, ett Bldg., Rockford, Ill., 3 story, 50x60 brick or concrete block factory, concrete

S., Halifax—WAREHOUSE, etc.—y Supplies, Ltd., Halifax, builders sup- warehouse and mill. $50,000.

t., St. Albert—PLANT—La Co-Operative nagere de St. Theophile, c/o J. Richer, Albert, Twp. of Cambridge, plant. $40,-

t., Thorold—ABATTOIR—Essex Pack- Co. Ltd., 7 Arthur St., Essex, plans by C. Klaehn & Associates, 49 King St. E., chester, 75x85 ft., rein.-con. abattoir. 000. CD 12/6—ENR 12/9.

t., Toronto — PLANT — Annfern Forest ducts Ltd., R. W. Brownell, 330 Bay woodworking plant. $50,000.

t., Toronto — PLANT — Chinook Supply Ltd., c/o C. M. Sinclair, 2881 W. Dundas iron, steel, wood and plastic goods mfg. nt. $40,000.

t., Toronto—PLANT—Owner, c/o I. M. nders, archt., 26 Queen St., E., 2 story, nt., 80x150 ft., brick, steel frame mfg. t, concrete fdn. $80,000.

t., Toronto — PLANT — Paradise Chil- 's Wear Ltd., c/o V. Giblan, 484 Rus- Rd., children's wearing apparel, etc. plant. $40,000.

t., Toronto—FACTORY—Royal Knit- Co. Ltd., 1 Silverwood Ave., plans by Brown, 21 Dundas Sq., 2 story, part nt., 52x120 ft., brick knitting factory, crete fdn., 552 King St. W. $40,000.

t., Toronto—WAREHOUSE—J. E. Hal- purch. agt. Shell Oil Co. of Canada, 25 Adelaide St., soon lets contract 1 y, 60x300 ft. brick warehouse, concrete Carlaw Ave. $75,000.

t., Toronto—FATORY—York Leather ducts Ltd., c/o D. Sussman, 20 Austin scent, factory. $40,000.

t., Trenton—COLD STORAGE PLANT ntral Cold Storage Ltd., Trenton, cold age plant. $50,000.

t., Wallaceburg — PLANT — National ssure Cooker Co. Ltd., Wallaceburg, 1 y, 150 x 150 ft., steel, concrete brick, t, concrete fdn. $50,000. J. Hood, Burl- ton, supt.

e., Amos—DIAMOND DRILLING— yrand Mining & Development, Ltd., diamond drilling. $90,000. P. Malouf, Owner, engr.

e., Amos—PLANT—La Revue Moderne and Associated Companies, c/o H. thier, Amos, printing, lithographing nt, etc. $40,000..

e., Montreal—PLANT—Air Vent Sheet al Ltd., c/o M. A. Mendell, 159 W. Craig machine tool, dies, etc. mfg. plant. 000.

e., Noranda—MINING DEVELOPMENT le-Rouyn Ltd. Noranda, mining develop- nt, incl. shaft sinking and necessary ctures. $85,000.

e., Quebec City—FACTORY—Sico Paint, 89 First Ave., 1 story factory. $50,000.

S ASKED

Bids Asked October 1

x., Houston—SHOP—Houston Oil Field terials Co., 1524 Maury St., 1 story, 200 ft. brick, concrete, tile, steel shop 22x82 ft. wing, Wayside Dr. $240,000. Moore, 3008 W. Alabama Ave., archt.

a., Altoona—BAKERY—Stroehmann Bros. H. J. Stroehmann, in charge, 339 Wash- ton Bldg., Williamsport, 2 story, bsmnt., 00 ft., brick, hollow tile, steel bakery n., sprinkler sys. $40,000. C. Wagner, W. 4 St., Williamsport, archt. CD —ENR 5/25.

NTRACTS AWARDED

nn., East Hartford—PLANT, etc.—Pratt Whitney Div. United Aircraft Corp., 400 n St., brick, steel rein.-con. bldg., and al work wind tunnel, to Turner Constr. 38 Newbury St., Boston, Mass., $475,000. ert Kahn Associated Architects & Engi- s, Inc., 345 New Center Bldg., Detroit, h., engrs.

nn., Naugatuck — FACTORY — Nauga- Chemical Div., U. S. Rubber Co., Elm brick, concrete, steel factory process , laboratory and office, to W. J. Megin Inc., 51 Elm St. Est. over $40,000. 9/6. Blaw Knox Co., 342 Madison New York, N. Y., engrs.

nn., Stratford—STRATOSPHERE FACIL- ES—Chance Vought Div. United Aircraft ., 550 Main St., fdns. for stratosphere ilities, aircraft plant, Main St., to John Ryan Constr. Co., 369 Lexington Ave., York, N. Y. Total est. over $40,000. 9/6. CD 9/5—ENR 9/7.

., Shreveport—PLANT—Brewster Co., Fannia St., 140x320 ft., concrete, steel bldg. Fortson St. in Agurs, Shreveport, C. H. Treadwell, 1523 Centenary Blvd. 120. CD 9/1—ENR 9/7.

ss., Brighton (sta. Boston)—PLANT— England Rendering Co., Abattoir nds, 80x180 ft., brick glue bldg. addn. ations, concrete fdn., to Sawyer Constr. 81 St. James Ave., Boston, approx. . CD 9/6—ENR 9/14.

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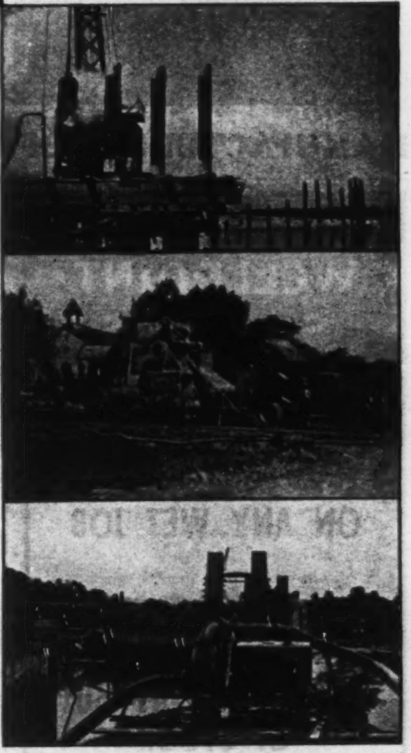

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INDUSTRIAL BLDGS. (Contracts Award
Cont.d.)

Mass., Dorchester—STORAGE—Frost C
& Oil Co., 488 Neponset Ave., 15x123 ft.
35x123 ft. timber storage bldg., to John
Proctor Co., Inc., 89 Broad St., Boston.
$45,000.

Mass., New Bedford — MILL — Natio
Pairpoint Co., Prospect St., 1 story, 17x44
ft., wood, steel mill addn., concrete fdn.,
Olson & Appleby, 222 Union St., app
$40,000 incl. equip.

Md., Baltimore—CABLE BLDG.—West
Electric Co., 2500 Broenning Hy., Cable B
30 addn. Owner builds. **$300,000.**

Minn., Detroit Lakes — PLANT — La
Dairy Cooperative, H. T. Johnson, pr
Audubon, general contract 1 story,
bsmnt., 72 x 108 ft. milk dehydrating pl
rein.-con., brick, tile, to Elan & Ness, Fe
Falls, **$39,625.** CD 8/16—ENR 8/24.

Minn., St. Paul — PLANT — G. Bartu
Packing Co., 567 North Cleveland A
general contract plant addn., alterations,
Constructor Co., 786 Eustis St. Est. $75,
Molkenbur & Lutz, 2168 Juliet Ave., archt

N. J., Mt. Holly—WAREHOUSE—F
more Bros., 15 Buttonwood Ave., 1 st
100x200 ft., cinder block warehouse, to
thur Venneri Co., 259 N. Broad St., Elizab
$45,000. W. Hankin, River Rd., Washi
ton's Crossing, N. J., (P. O. Taylorsvi
Pa.), archt.

N. J., Nutley—PLANT—Electro-Techni
Products Co., 113 E. Center St., 1 st
75x400 ft., concrete block, stucco mfg. pl
separate contracts. **$50,000.** J. R. Kor
264 New York Ave., Newark, archt.

N, H., Concord—FACTORY—Davis Tra
former Co., 295 North State St., 1 st
80x100 ft., brick, steel factory addn., to D
son Constr. Co., 1306-A Elm St., Manche
Est. **$40,000.**

N. H., Keene—FACTORY—H. Kharfen,
Washington St., 1 story, 62x160 ft., b
factory, Washington St., to G. W. Scott,
Washington St. Est. **$43,000.**

N. H., Keene—PLANT—New Eng
Screw Co., Emerald St., 1 story, 110x200
brick, steel plant, to Davison Constr.
1306-A Elm St., Manchester. Est. **$100,**

O., Cleveland—PLANT—Chase Bras
Copper, W. L. Smith, factory supt.,
Babbit Rd., installing heavy rein.-con. f
ings and fdns., for machine installations
10 ton structural steel overhead crane,
Cleveland Constr. Co., 3866 Carnegie
Est. **$100,000.**

O., Cleveland—FACTORY—Cleveland G
phite Bronze Co., B. F. Hopkins, pres., 1
St. Clair Ave., 1 story, 200x300 ft., br
steel, concrete Plant 5 factory addn.,
Albert M. Higley Co., 2036 E. 22 St.
$275,000. Awarded 9/8. J. H. Grah
archt. and F. Saltzman, engr,; both c/o ow

O., Cleveland—SHEAR SHOP—Ohio Fo
& Machine Co., Co., S. C. Dalbay, pres.,
Woodhill Rd., 1 story, 50x71 ft., brick,
shear shop, to H. L. Vokes Co., 5300 Che
Ave., **$40,000.** A. R. Simon, c/o contrac
engr.

Ore., Portland—PLANT—Portland Fa
cating Co., 740 N. Page St., reconstruct
forging plant, to Jan J. Malarkey Co
Co., 923 S. W. 17 St. **$50,000.** Awarded

Pa., New Castle—PLANT—United E
neering & Foundry Co., G. T. Ladd, p
1st Natl. Bank Bldg., Pittsburgh, p
addn., installing 12 furnaces, brick w
steel, to International Chimney Corp., Cu
Bldg., Buffalo, N. Y.; piping, to Sch
Choffin Co., 12 Hogue St., Youngstown,
Est. **$40,000.** W. R. Hodder, project m

R. I., Bristol—FACTORY—United St
Rubber Co., 500 Wood St., 3 story, 50
ft., brick, steel mfg. bldg., concrete f
to H. V. Collins, 7 Dyer St., Provide
over **$75,000.** CD 8/30—ENR 9/7.

R. I., Cranston—TRUCK GARAGE, et
Adley Express Co., Inc., 216 Crown St.,
Haven, Conn., 1 story, brick, steel tr
garage and freight terminal, Elmwood A
to E. Turgeon, 614 Turks Head Bldg., Pr
dence. Est. **$60,000.** Bids 8/6. CD 8/2
ENR 8/31.

Tex., Corpus Christi—QUICK FREE
AND STORAGE PLANT—Duke Collum,
City Council, seafood quick freeze and s
age plant, own forces. **$100,000.** CD 5/
ENR 5/25.

★**Tex., Katy** — RECYCLING PLANT
Humble Oil & Refining Co., c/o F. Wa
purchasing agt., Humble Bldg., Hou
recycling plant addn., to Hudson Engineer
Co., 2711 Danville St., Houston, app
$700,000.

Tex., Houston—PLANT—Houston Oil F
Materials Co., 1524 Maury St., 1 story,
160 ft., masonry and steel chemical p
units, facilities, to W. S. Bellows Co
Co., Box 2132, **$95,000.** CD 8/9—ENR 8/1

Tex., Uvalde—WAREHOUSE—H. W.
tle, Inc., Uvalde, masonry type wareho
to G. W. Mitchell, 612 American Hospita
Life Bldg., San Antonio, **$40,000.** Morri
Noonan, 801 American Hospital & Life B
San Antonio, archts. CD 6/22—ENR 6/

Wis., De Pere—BEATER ROOM—U.
Paper Mills Corp., De Pere, 1 story, 6
ft., brick, concrete beater room bldg.,
Selmer Co., Northern Bldg., Green Bay.

STRIAL BUILDINGS (Contracts
arded, Cont'd.)

, Roanoke—FREIGHT TERMINAL, etc.
sociated Transport, Inc., c/o A. J. Car-
archt., 335 Memorial Ave., West Spring-
Mass., brick, steel, concrete freight
inal, truck garage, to Eubank & Cald-
Boxley Bldg. Est. $50,000. Bids 8/14.
/9—ENR 8/10.

B. Moncton—PLANT—Swift Canadian
Ltd., J. A. Ford, mgr., Albert St., curing
bldg. addn., hide cellar and fertilizer
, to Richard and R. A. Ryan, Ltd., 1808
am St., Montreal, Que. $69,000. CD
—ENR 8/23.

, Leaside (Toronto) — SERVICE
EHOUSE—Margison & Babcock, archts.,
Wellington Bldg., Toronto, 1 story,
42 ft. service warehouse, for Sheridan
ment Co., Ltd., 7 Industrial St., to
e Const. Co. Ltd., 17 Yorkville Ave.,
. Est. about $55,000. CD 8/9—
8/17.

, Niagara Falls — PLANT — Canadian
otton Products Co. Ltd., 431 Victoria
4 story, 75 x 100 ft., plant addn., to
Bros. Constr. Co. Ltd., 1740 Ellen St.
$75,000. CD 9/12—ENR 9/14.

, Sarnia—PLANT—Imperial Oil, Ltd.,
urch St., Toronto, brick plant, to Shaw
Co. Ltd., Forest, about $48,700. CD
—ENR 4/6.

, Smith's Falls—FACTORY—Cairns
nts Ltd., 7 Maple St., factory, William
to M. Sullivan & Son Ltd., Arnprior.
$40,000. W. J. Abra, 55 Metcalfe St.,
wa, archt.

, Windsor — PLANT — Border Cities
y & Creamery Co., 636 Aylmer St., plans
eppard & Masson, 26 Equity Chambers,
atham St. W., 2 story, 42x85 ft., mason-
lant addn., concrete fdn. $40,000.

UNCLASSIFIED

POSED WORK

n., Fairfield — BEACH IMPROVE-
TS—Town, Bd. Recreation, Mrs. M. E.
, chs., making plans imprv. Sasco
, parking provisions, land construction,
ing road, constructing new road to
. $25,000.

—GAS PIPELINE CARRIER—
Service Gas Co., SE of City, Okla-
City, Okla., 5½ mi. 16 in. natural gas
ine carrier from point in Wilson Co.
nnect with 2 existing transmission line
ra. $40,000.

n., Minneapolis—HANGAR—Mid-Conti-
Airlines, Inc., 6501 34 Ave. S., 1 and 2
, 60x60 ft. hangar addn. at Wold-
berlain field (Minneapolis Airport).
. Larson & McLaren, 1901 Foshay
r, archts.

Dayton — REBUILDING BABBITT
—Moraine Products Div. of General
s, 1550 Wisconsin Ave., tearing down
abbitt line and rebuilding new babbitt
$57,500.

ahoma and Kansas—GAS PIPELINE
RIER—Cities Service Gas Co., SE of City.
homa City, Okla., 52 mi. 16 in. natural
pipeline carrier from Shidler, Okla., to
, Kan. $300,000.

, Bristow-Mounds—NATURAL GAS
LINE—Oklahoma Natural Gas Co., 624
ston St., Tulsa, exten., reconditioning
al gas pipelines. Over $40,000.

, Dallas — AIRPORT BLDG. — City,
g size existing administration bldg.,
Field. $150,000.

ah, Brigham—SWIMMING POOL—U.
., 580 S. State St., Salt Lake City,
s plans 60x100 ft., all-year, closed-in
ming pool at Bushnell General Hos-

shington — RAILWAY REPAIRS —
ern Pacific Ry. Co., B. Blum, ch. engr.,
5 St., St. Paul, Minn., repairing branch
Elma to Shelton. $294,840.

Va., South Charleston — STORAGE
, etc.—Carbide & Carbon Chemicals
, 30 E. 42 St., New York, N. Y., in-
s anhydrous ammonia storage tank,
ne oxide storage tank and soaking
. $146,700.

ta., Calgary—COAL MINING DEVEL-
PMENT—Syndicate, c/o R. M. Sweezey,
James St. W., Montreal, Que., initial
opment extensive coal mining property
ighwood River Valley. $700,000. G.
ns Evans, Smith Tower, Seattle, Wash.,

ta., Okotoks—RAILWAY LINE—Syn-
ate, c/o R. W. Sweezey, 132 W. St.
St., Montreal, Que., 42 mi. railway line
Okotoks to portals of Highwood River
Mine. $500,000. G. W. Evans, Smith
, Seattle, Wash., engr.

B., Bathurst — PLAYGROUND, etc. —
ipality, playground and recreational
ies. $38,000.

—GOLF CLUB, etc.—Recreational
of Ottawa, c/o M. E. Kenny, R. A.
Rideau St., Ottawa, Ont., preparing
golf club, $75,000, summer resort,
, ski lodge $40,000.

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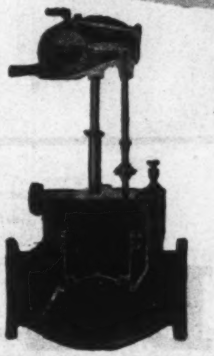

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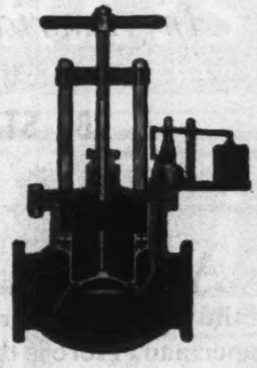

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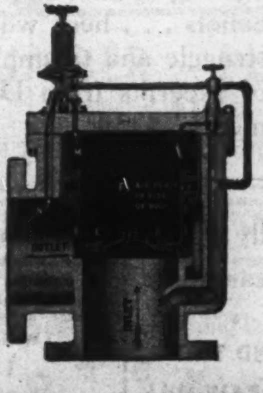

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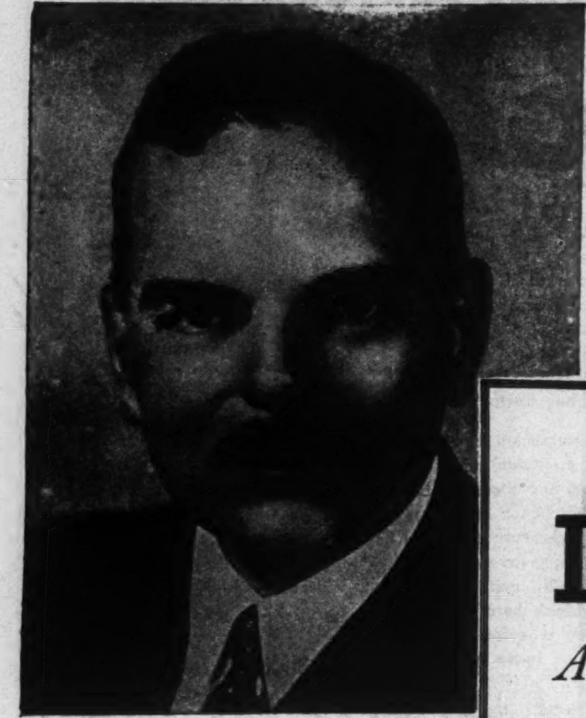

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CLASSIFIED (Cont'd.)
s ASKED

Bids Asked September 28

Va., **Dahlgren**—ELECTRIC DISTRIBU-
N SYSTEM—Yards & Docks, Navy Dpt.,
St. and Constitution Ave. N.W., Wash.,
D. C., imprv. electric distr. sys. at Naval
ving Ground, NOY 10732.

W BIDDERS

Calif., **Hamilton Field**—APRONS—U. S.
, 74 New Montgomery St., San Francisco,
e 19, aprons at Air Transport Command,
c. 1775, from Fredrickson & Watson
tr. Co., 873 81 Ave., Oakland, $477,379.
8/29—ENR 8/31.

Calif., **Oakland**—TAXIWAYS—U. S. Eng.,
New Montgomery St., San Francisco, Zone
Taxiways A and B at Oakland Municipal
ort, Spec. 1400-1, from Piazza & Hunt-
175 S. Montgomery St., San Jose,
,497.

Y., **Brooklyn** — SURFACE RAILROAD
ACKS—Bd. Transportation, 250 Hudson
New York, Zone 13, Sept. 12, renewing
ace railroad tracks, Wythe Ave. from
llabout Ave. to S. 8 St., from R. P.
tters, 475 5 Ave., New York, $45,832.

TRACTS AWARDED

Calif., **Fairfield** — APRON PREPARA-
N, etc.—U. S. Eng., 1209 8 St., Sacra-
to, Zone 8, excav., and preparation of
base for aprons and taxiways at Fair-
-Suisun Air Field, Spec. 960, to Morrison-
dsen Co., 111 Sutter St., San Francisco,
,341. CD 8/29—ENR 8/31.

Colo., **Pueblo**—DOCKS, etc.—U. S. Eng.,
17 St., Denver, docks, sheds and bumper
s at Pueblo Air base, to Johns Engineer-
Co., 3703 Ames St., Denver, $60,000.

a., **Atlanta**—ANTOMATIC SPRINKLER
TEM—U. S. Eng., Post Office Bldg.,
nnah, installing, completion automatic
nkler sys., Fort McPherson, to Century
nkler Corp., 305 Graham St., Richmond,
$479,835. Bids 9/11. CD 9/6.

d., **Evansville**—TANK TEST TRACK—
Eng., 612 Federal Bldg., Louisville, Ky.,
test track for Evansville Ordnance, to
l Constr. Corp., 403 Court Bldg.,
,240.

ss., **Martha's Vineyard**—AIRPORT
ING—Yards & Docks, Navy Dpt., 18
nd Constitution Ave. N.W., Wash., 25,
, paving addnl. plane parking area, air-
NOY 10130, to McCourt & Condon Co.,
Huntington Ave., Roxbury, $55,799.
7/31. CD 7/25.

s., **Southbridge**—HANGAR, etc.—Town,
Selectmen, Town Hall, hangar, 2,000 ft.
2,500 ft. runways, to F. J. Shields, 91
al St., $59,251. CD 9/8—ENR 9/14,
LB.

M., **Alamogordo**—AIR BASE—U. S.
Albuquerque, addnl. work, Army Air
to Gaastra & Gilbert, 1534 Las Lomas
$40,122. Awarded 9/15.

M., **Hobbs**—AIRFIELD BLDG.—U. S.
4 and Gold Sts., Albuquerque, ware-
, Army Airfield, to H. W. Balay, Albu-
que, $40,000.

Akron — RADIO TRANSMITTER
E, etc.—United Broadcasting Co., Sta-
WCLE, H. K. Carpenter, vice pres.-
mgr., Terminal Tower, Cleveland, ra-
ansmitter house, towers and broad-
g studio, to Carmichael Constr. Co.,
Miller Ave. Est. $150,000. R. Dicker-
13124, Shaker Sq., Cleveland, archt.

Cleveland—TANK STORAGE CRIB-
WORK, etc.—Standard Oil Co. of
c/o H. West, engr. in charge, Mid-
Bldg., cribbing work, excav. and pump
for addnl. tank storage, to Paugh &
, Inc., 6007 Euclid Ave. Est. $85,000.

ahoma—REMOVING PIPE—Sinclair
Line Co., Bartlesville, removing 8½
in. screw pipe near Tulsa and Nowata,
C. Price Co., Bartlesville, $25,000.

, **Laredo** — POORMAN RANGES —
Eng., Fort Sam Houston, poorman
, to Cunningham & Dinn, 2024 N. St.
St., San Antonio, $47,356. Awarded

, **Seminole**—OIL PIPELINE—Atlantic
Line Co., Magnolia Bldg., Dallas, 5½
in. oil pipeline, force account. $45,000.
23—ENR 8/31.

, **Tyler** — OIL PIPELINE — Phillips
eum Co., Esperson Bldg., Houston,
oil gathering pipeline sys., force ac-
$80,000. CD 9/8—ENR 9/14.

, **Calgary**—OIL PIPELINE—British-
can Oil Co. Ltd., Calgary, 17½ mi. 6 to
crude oil pipeline, near here, to
Gentry Engineering Co., Calgary,

, **Edmonton**—AIRPORT STRIPPING,
Dpt. Transport, Ottawa, Ont., stripping.
s, drainage, concrete hardsurfacing
ys, etc., airport, to Crown Paving
Co., Ltd., Edmonton, about $193,000.

., **Watson Lake**—AIRPORT GRADING,
Dpt. Transport, Ottawa, Ont., grading.
ucting concrete runways, bituminous
ing airport, to General Const. Co., Ltd.,
ille Island, Vancouver, about $140,000.

al ***Advertisements see p. 202 & 218***

Postwar Projects see p. 140

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Fig. 289-B
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Pattern
125 lb.

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Nashua,	N. H.	Texarkana,	Tex.	Montgomery,	Ala.	Alameda,	Cal.
Charleston,	S. C.	N. Little Rock,	Ark.	Grenada,	Miss.	Portland,	Ore.

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CONSTRUCTION BY CONTRACT
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OFFICIAL PROPOSALS

Bids: Oct. 4 (300)

State Highway Work

STATE DEPARTMENT OF PUBLIC WORKS BUREAU OF CONTRACTS & ACCOUNTS
ALBANY, N. Y.

Sealed proposals will be received until one o'clock p.m. eastern war time, by Henry A. Cohen, Director, Bureau of Contracts & Accounts, 14th Floor, State Office Building, Albany, N. Y., on *WEDNESDAY, OCTOBER 4, 1944*, for the construction of the following highway project:

County	Deposit for plans	Bid deposit	Type	Miles	Priority
Orange	$10	$10,000	22' ROB Gravel Double Surface Treatment	4.13	Serial #121369 A.A. 3 All Mats.

AND ALSO FOR REPAIRS TO THE FOLLOWING—DISTRICT OFFICE BUILDINGS:

Broome	5	5% of the bid	Reroofing Machine Shop and Storage Sheds, District Office at Binghamton, N.Y.
Jefferson	5	5% of the bid	Boiler Brickwork Repairs Boiler House, District Office at Watertown, N. Y.

Maps, plans, specifications, and estimates may be obtained at the office of the Department of Public Works, Bureau of Contracts & Accounts, Albany, N. Y., and at the office of the District Engineers in whose districts the work is located. The addresses of the District Engineers and the counties will be furnished upon request, and may be seen at the office of the State Department of Public Works, State Office Building, Room 898, Worth & Center Streets, New York City.

The deposit for Plans and Proposal Forms for each contract containing 1 to 15 sheets is $5.00; 16 to 30 sheets, $10.00; over 30 sheets, $20.00. A refund will be made in full to bidders for return of one set, in good condition, within 30 days of the award, or rejection of bids; refund for all other sets in good condition, similar period, will be 50% of deposit.

Special attention of bidders is called to "General Information for Bidders" in the proposal, specifications, and contract agreement, and to the special provisions applying to projects financed with federal funds. Proposal for each contract must be submitted in a separate sealed envelope with the name and number of the contract plainly endorsed on the outside of the envelope. Each proposal must be accompanied by cash, draft or certified check payable to the order of "State of New York, Commissioner of Taxation & Finance" for the sum as specified in the advertisement and the proposal. The retention and disposal of the bidding check, the execution of the contract and bonds shall conform to the provisions of the Highway Law, as set forth in "Instructions to Bidders."

When optional types are permitted on contracts with federal funds, bidders must state in the space provided in the proposal the exact designation of the optional type upon which the proposal is predicated.

Minimum Wage Rate per hour for above work shall be as follows:

County	Skilled Labor	Intermediate Grade Labor	Unskilled Labor
Orange.	$.85	$.85	$.85

UNLESS SHOWN OTHERWISE IN T ITEMIZED PROPOSAL FOR EA PROJECT. The right is reserved to re any or all bids.

CHAS. H. SELL
SUPT. OF PUBLIC WORK

Bids: Oct. 4 (2

Water Pipe Line

Sealed proposals will be received by Mayor and City Council in the City at Coatesville, Chester County, Penn vania, until 3:00 o'clock p.m. on Oct. 1944, at which time and place the bids be publicly opened and read aloud, for construction of approximately 14,700 li feet of 8", 12" and 16" water pipe line diversion dam; and miscellaneous ap tenances in the water system.

Copies of the plans, specifications other contract documents are on file open to public inspection at the office Albright & Friel Inc., Consulting Engine 1520 Locust Street, Philadelphia 2, Pe and at the office of the City Engineer Coatesville and sets of the documents be obtained at the office of the Consult Engineers or at the office of the Engineer, upon a deposit of $20.00 for set of documents. If the documents returned in good condition within five days after the opening of bids, the amount of the deposit for one set will refunded to each actual bidder; and o deposits will be refunded with a deduct of $10.00 to defray the actual cost of production of the sets of documents. the documents are not returned within time stated, the entire amount of dep will be forfeited.

A certified check equal to five per (5%) of the amount of the bid must submitted with the proposal as bid secu A bid bond may be substituted for a ce fied check.

No bid may be withdrawn for thirty (days after the scheduled closing time receipt of bids.

The Mayor and City Council of Coa ville reserve the right to waive any in malities in or to reject any or all bids.

Frank P. Pennega
City C

Adv- 9/14 - 9/21, 1944

Additional OFFICIAL PROPOSAL on page 218

WHERE TO BUY
Featuring additional products, specialties, and services for the Construction Industry

STEEL AND HEAVY WOOD CONSTRUCTION AND HEAVY RIGGING OF ALL TYPES.
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Dayton 9-7474

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Telescope 12" long, 25 power—Horizontal Circle 4½" with vernier to 5 minutes—Vertical Arc 3"—Clamp and Tangent Screw for Vertical and Horizontal Limb—Instrument weighs 11 pounds, tripod 9 pounds.
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HARTFORD CONNECTICUT

he Week In Engineering and Construction

INEERING NEWS-RECORD • SEPTEMBER 21, 1944 • VOLUME 133 • NUMBER 12

WA survey shows lag in ostwar public works plans

ss than 8 percent of 16 billion dollar local governent program, including federal-aid work planned by ate road departments, is completely planned.

y members of the armed forces ing to find immediate postwar ement on public works construction be greatly disappointed unless action is taken to increase the volf completed project plans. This conclusion to be drawn from a al Works Agency report released eek on postwar planning progress te, county and municipal agencies. gh the study indicates a reservoir teen billion dollars of construction stages of planning by local govental bodies, projects that are in mpletely designed stage total only ,000,000, and funds are available ry out but one-fourth of the proj this status.

Few active localities

s total is more disappointing when kdown of the completed plans is This analysis reveals that only 00,000 of state highway work is for contract, and that two-thirds $924,905,000 total (excluding cost d) of all other types of work for plans are ready was reported by e and local governments of only tes—New York, California, Illiichigan and Ohio. Further analyws that two-fifths of all completed for other than highway work is rated in the five cities of New Chicago, Philadelphia, Detroit Angeles. The vast majority of ies under 25,000 population have little planning progress.

t side of the survey picture is ge volume of construction in the design" and "preliminary design" This total provides for over billion dollars of work and innearly two billion dollars of highrojects and some $5,044,000,000 er types of construction.

ainder of the sixteen billion dolservoir is in the "idea" stage. This class accounts for over eight billion dollars, including nearly two and one-half billion dollars of highway construction.

Report is conservative

In preparation of the report it was assumed that no plans had been completed nor were being prepared by those government units that failed to reply to the FWA questionnaire. As a result, in the totals of completed plans for other than state highway work no projects are included for four states, none for nine of the 92 cities of a population of 100,000 or more, and for only 252 of the 599 municipalities in the 10,000-25,000 bracket.

Neither do the totals include normal maintenance projects, work now underway or to be completed as part of the war program, public housing, and federally financed projects, such as river and harbor operations.

All projects being planned were listed as falling in one of nine classifications. The classifications were: (1) Highways, roads and streets; (2) bridges, viaducts and grade separations; (3) airports, terminals and landings; (4) sewer, water and sanitation facilities; (5) schools and other education facilities; (6) hospital and health facilities; (7) public buildings other than those in classes 5 and 6; (8) parks and other recreational facilities; and (9) miscellaneous public facilities.

On the basis of this classification the greatest volume of construction planned was in the "highways, roads and streets" category. This situation is explained by the fact that $50,000,000 of federal funds was made available to the states

(Continued on page 73)

N.Y. City ready to spend $400 million on 1945 construction if U.S. pays half

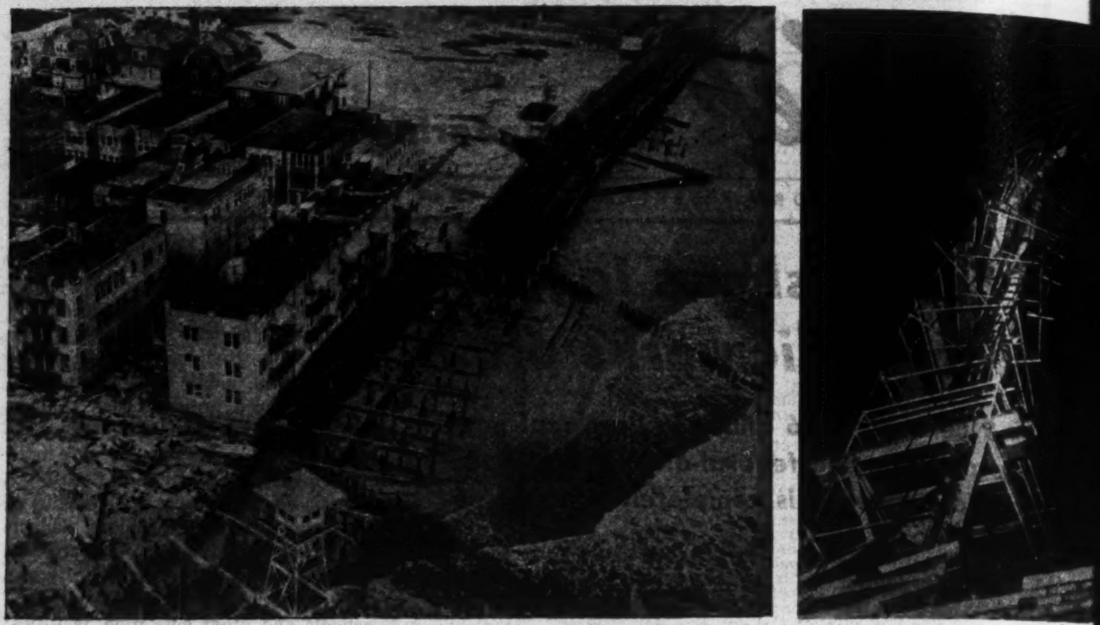
New York City is prepared to carry out a $400,000,000 construction program in 1945 if Congress acts at once to meet half the cost, Mayor F. H. LaGuardia declared last Sunday in his weekly radio broadcast. The mayor also disclosed that in his annual capital budget message to the City Planning Commission he had certified that the city might safely incur debt up to $300,000,000 for capital projects in 1945.

The mayor's $400,000,000 program is made up of $150,000,000 of new capital expenditures for work other than highways and housing, which he expects to be matched with federal funds in a like amount, $30,000,000 of federal and state aided highway work, $30,000,000 to $40,000,000 of low-cost housing, $20,000,000 of improvements covered by assessments, $15,000,000 of new work on the Brooklyn-Battery Tunnel, and $1,000,000 spent by the Triborough Bridge Authority.

Mayor LaGuardia stated that the city and the New York City Tunnel Authority were planning to apply to the War Production Board for priorities on about 700 tons of nuts and bolts needed before work can be resumed on the Brooklyn heading of the Brooklyn-Battery Tunnel, work on which was stopped early in th ewar. The Tunnel Authority has the castings for the lining but lacks the large forged bolts that must be on hand before soft ground tunneling from the Brooklyn end can get under way again. The New York heading is in rock, so it can start anytime.

In the interim since the work was shut down the Tunnel Authority, according to Ole Singstad, chief engineer, has completed all its contract drawings and so is in a position to put a large amount of work under contract at any time.

(Continued on page 72)



Acme P

Atlantic City bears the brunt of a tropical coastal storm

Worst damage from the tropical storm that lashed the eastern seaboard last week occurred to New Jersey beaches and beach structures. At Atlantic City miles of boardwalk were torn up and piers extensively damaged. Hotels and homes were flooded and power service disrupted. Pictured above is a section of the beachfront at the resort city.

There was considerable marine damage, especially to small boats, all along the eastern coast. Trees throughout the area were blown down, blocking highways and carrying electric and telephone lines with them. Fallen electric wires were said to be the cause of many of the more than forty deaths attributed to the storm. Adequate warning and early evacuation of beach areas kept down the death and property toll though the latter has been estimated by newspapers at as much as $50 million.

In contrast to the 1938 storm (ENR Sept. 29, p. 386 and Oct. 6, 1938, p. 425) has been little damage to important tures. A temporary pipe scaffold (ri extending 85 ft. above the roof of a 60- building in midtown New York City twisted but survived the 85-100 mph. of wind at the height of the storm. bridges of noteworthy size were affected there were no floods of more than local sequence, despite two days of rain prece the tropical downpour of the storm.

Serious water problems forecast for Arizona

Indications that large sections of central and southern Arizona soon may be confronted with a serious water problem as a result of a shortage of precipitation, now in its second year, were contained in a U. S. geological report issued Sept. 9 in Tucson.

The report, which dealt with ground water conditions and pumpage, showed that in Pinal County, pumping from underground supplies has risen from 372,000-ac. ft. in 1940 to 515,000-ac. ft. in 1943. In other regions, pumpage has increased proportionately.

Heavy decreases in water tables were also recorded in several areas. The report showed that in the Elroy area the table has dropped 12 ft. in the last two years and in the Maircopa district the drop was 10 ft. The total drop in the Elroy area from 1940 to December, 1943, was 18½ ft. The Queen Creek area dropped 2½ ft. in 1942 and 3 ft. in 1943.

Governor and cabinet discuss Pittsburgh roads

A 5-year, $75,000,000, state highway improvement plan for Pittsburgh and Allegheny County was discussed by Governor Edward Martin and his cabinet at a meeting Sept. 8 in Pittsburgh. The plan involves 107 miles of road, and is part of the state-wide program to cost $516,000,000.

Plans for one-third of Allegheny County projects will be blueprinted by November, John U. Shroyer, secretary of highways, revealed. Plans for the Penn-Lincoln Parkway will be completed in October.

State and city officials have agreed tentatively to classify the Ohio River Boulevard extension as No. 1 project for postwar improvement, Penn-Lincoln Parkway to rank second in importance.

◆

Texas State Highway 183, a faster and shorter route to Fort Worth from North Dallas, is scheduled to be opened for traffic in October.

Illinois reports on postwar planning

Detailed plans and specifications been completed or are in progress $35,538,000 worth of postwar pu works in Illinois, exclusive of the of Chicago, according to a progres port dated Sept. 1, by the Illinois P war Planning Commission.

In addition to plans already pleted, sketch plans for $54,396 worth of work have been completed are now in progress; surveys have completed or are in progress for 700,000 worth of construction; preliminary estimates only have prepared for $128,758,000 of post public works.

Improvements included in this posed $237,392,000 program street improvement, sanitary and sto water sewers, sewage treatment water supply, schools and other pu buildings, bridges and grade separa structures, airports and parks, po generating plants and distribution.

enate cuts postwar highway fund $1,350,000,000 for three years

thorized annual appropriation for each of three years following war set at $450,000,000 to be matched by the states

Senate on Sept. 15 passed the postwar highway bill (S. 2105) greatly amended form from the al bill. Principal changes were ction in the amount authorized to propriated annually in each of the postwar years from $650,000,000 original bill to $450,000,000 ution of the 50-50 matching pro- s of prewar years, and changes in method of apportionment. Elimi- were all provisions for using fed- funds for the purchase of rights- y. The bill now goes to the House, the Robinson bill is pending.

tion on the Robinson bill in the e (H.R. 4915) is to be postponed after election, according to Major- eader McCormack.

Distribution of funds

e $450,000,000 annual appropria- authorized in the Hayden bill is ed as follows: $200,000,000 for cts on the federal-aid system; 000,000 for projects on principal dary and feeder roads; and $125,- 00 for projects on the federal-aid n in urban areas, communities of 5,000 population.

e $200,000,000 for the federal-aid n is to be apportioned among the by the old federal-aid formula, ea, 1/3 population, and 1/3 post-road ge.

nds for secondary roads are to be tioned on the basis of 1/3 area, 1/3 population, and 1/3 rural-delivery and "star routes." A further sion makes it possible for states g a population density of more 200 per square mile to expend funds without regard to municipal daries. This provision would be ap- ble in Massachusetts, Rhode Island, ecticut, New York, and Pennsyl-

tates where the state highway de- ents have control over all public the secondary road funds can be on the federal-aid system, if ap- d by the U. S. Commissioner of Roads. States affected by this ion are Delaware, Virginia, West ia and North Carolina.

ds for work in rural areas are to portioned among the states in the that the population of cities of or over bears to the total popula- f all such cities in the country.

references to using federal funds for the purchase of right-of-way that were included in the original bill were eliminated from the amended bill as passed.

Of the $450,000,000 to be appropriated for the first postwar fiscal year, the sum of $100,000,000 is to become immediately available to the states for making plans and surveys and for construction, but no other part of the funds can be used to pay the cost of contracts entered into before the beginning of the first postwar fiscal year.

Crossing eliminations

Not less than 10 percent of all three classes of funds must be used to eliminate highway-railway grade crossings. The construction costs of such projects, other than those paid by the railways concerned, may be paid out of federal funds without matching by state funds, provided the railways pay not less than 15 percent of the construction costs.

In states that find it impossible to match their full share of the federal fund, the Federal Works Administrator may waive the matching requirements provided: (1) That all special taxes on motor vehicle transportation are applied to highway purposes; (2) that least 90 percent go to operating, maintenance and administrative expenses and interest and amortization of highway bond; (3) that the rate of none of such taxes has been reduced since Sept. 1, 1944, and that the proportion of such funds that is available for construction, together with any other funds for highway purposes, will be inadequate to match the federal allocations.

Forest and park roads

The bill also carries $25,000,000 for each of the three postwar years for forest highways, $12,500,000 for forest roads and trails, $4,250,000 for construction and maintenance of roads in national parks, and $5,000,000 for parkways to give access to national parks or monuments.

Up to 1½ percent of the federal funds can be used for advance planning of future extensions of the federal-aid system and for secondary roads.

As the states will have to put up about $405,000,000 of matching funds, this represents a total federal-aid program of about $900,000,000 per year for three years following the war.

Bragdon made Engineers' Chief of Construction

General Bragdon

Brig. Gen. John S. Bragdon has been made Chief of Construction in the Office of the Chief of Engineers in Washington. In this position he will have general charge of all military construction activity in continental U. S. He was transferred to the Chief's office from command of the South Atlantic Division at Atlanta. In that position, since 1941, he supervised one of the largest and most diversified of the war construction programs, for which he was awarded the distinguished service medal for "exceptionally meritorious service."

General Bragdon is a West Pointer and has served all of his professional career in the army. He came out of World War I a Major in the Corps of Engineers. In 1929-31 he was on duty in the Philippines returning to serve in the Chief of Engineers Office. In 1937 he was made District Engineer at Providence, R. I., serving there until 1941.

Fowler to So. Atlantic Division

General Fowler

Brig. Gen. R. F. Fowler has been appointed division engineer of the South Atlantic Division of the Corps of Engineers with headquarters at Atlanta, Ga., succeeding Brig. Gen. John S. Bragdon. General Fowler was born in Alexander, Neb., on Oct. 14, 1884. He attended the University of Nebraska for two years before his appointment to West Point, from which he was graduated in 1910 and commissioned a second lieutenant in the Corps of Engineers.

General Fowler has led an active army life since his first tour of duty as assistant to the district engineer at Rock Island, Ill., in September, 1910, serving at many stations throughout the country and abroad. He was promoted to the grade of colonel Feb. 18, 1939, and on June 14, 1940, he became commanding officer of the 20th Engineer Regiment.

From July 1, 1941, until Jan. 5, 1942, he served as chief of the operations and training section in the Office of the Chief of Engineers. On Jan. 14, 1942, he was made chief of the supply division and on June 19, 1942, promoted to the temporary grade of brigadier general.

FROM AN EDITOR'S NOTEBOOK

A visit to the Tennessee Valley reveals that the effect of drought on power production, future TVA construction, disposal of surplus equipment and stream pollution are matters currently commanding attention.

Knoxville, Tenn—Most frequent subject of conversation in the upper Tennessee Valley is the drought that has continued over several months. However, despite the lowest natural streamflow in 40 years and the largest demand for power ever made in the area, the Tennessee Valley Authority has been able to supply all the electricity demanded of it. About 200,000 kw. of steam units are in constant operation now to conserve water against a possibility of prolonged low runoff in the late fall and some power is purchased from other utilities in the Southeast. Reservoirs are a little lower than a year ago, but water to produce 2.4 billion kwh. of electricity is in storage and there is no foreseeable danger of serious shortage.

Future TVA construction

The Tenessee Valley Authority has some definite plans for additional major construction but on a curtailed and much slower schedule than the rush to provide power for war necessary industry in the area.

The South Holston and Wautauga projects on the upper Holston watershed, on which $11 million was spent as emergency power projects before they were stopped by the War Production Board, are the best prospect for immediate work. When completed, the dams will give flood protection to Kingsport and Elizabethton and are planned to permit power installations. Resumption of construction is contingent upon availability of materials and manpower. A long construction period is contemplated.

The Fort Loudoun Dam extension, a project to take the water from the Little Tennessee River through Fort Loudoun Dam by construction of a dam and a canal, is now a future project planned for a time when power requirements overtake the present energy available in the Tennessee Valley. Added storage at Fontana, Douglas and other reservoirs on the headwater tributaries of the Tennessee has increased the dependable flow to a point where additional units are economical for many of the dams, but, once the war industries slacken, there may be excess power available from existing installations.

Foundation conditions at proposed sites for seven flood control dams on tributaries of the French Broad River above Asheville are being investigated preparatory to planning for possible postwar construction. Compared to other TVA structures, these will be rather modest, the seven dams being estimated to have a total cost, including reservoir rights, of $7 million. None of them will incorporate power facilities.

Fontana Dam

Construction at Fontana, N. C. on TVA's largest dam has progressed to the point where both of the hammerhead cranes used for construction have been dismantled and sent to storage. As of September 1, about 100,000 cu.yd. of concrete remained to be placed from a total of 2,800,000 cu.yd. Filling the reservoir is scheduled to start November first when flow in the Little Tennessee is expected to be sufficient to permit bypassing water to operate the Cheoah and Calderwood dams of the Aluminum Co., immediately downstream.

Considerable work remains to be done in the reservoir, including removal of 24 miles of railroad track, replaced by a 15.5 mile relocation of a branch line of the Southern R. R. above reservoir level. Part of the track is being left in place until the "last minute" to permit removal of construction equipment by rail. Highway hauling for heavy machines is precarious and expensive over the mountain roads.

Fontana construction forces have a war bond payroll deduction of 21.3 percent from 100 percent of the nearly 3,000 on the payroll. Purchases through the job accounting offices amount to 24 percent of the total payroll; were 20 percent after the fourth war loan and 15 percent after the third loan.

Something new has been added to construction at Fontana Dam. Project Manager F. C. Schlemmer has had a public address system installed on the project, not just in the mess hall and at the time-checking gate, as has frequently been done at shipyards, but with outlets all over the project so that workmen need not, in fact cannot, miss the broadcast. The address system is used to "sell" Americanism, bonds, safety and the importance of the construction job. Top members of the construction forces and visiting dignitaries make recordings that are put o
address system at various times to
workmen on all shifts.

Kentucky Dam

Tva's greatest flood control dam
second largest structure in co
volume, has reached final closure
pool-raising stage. The 184 mile
reservoir, extending across mo
Kentucky and Tennessee to Pick
Dam, has a capacity of 4,100,00
of usable storage, said to be suf
alone to reduce flood heights at C
Ill., by 2 ft. Use of the full pool
city must await completion of rai
relocation sometime next spring.
ENR Aug. 31 1944, vol. p. 251).

Second-hand equipment

The Construction Plant Divisi
the Tennessee Valley Authority is
second-hand equipment business. U
direction of R. T. Colburn it is disp
of $8 million worth of used constru
equipment at a rate of $1 milli
month. Some $4 million worth of e
ment will be retained for possible f
work. Prices are good, sales bris

In some cases ceiling prices,
on a percentage of cost new in
are higher than cost of the equip
when it was purchased in the mid-
ties, so TVA is getting almost first
for some long-lived, well-maint
machines. Small pieces are mo
rapidly, some larger units are going
storage. Government and war
tracts have preference; foreign c
tries are buying under approval o
War Production Board.

Incidentally, the Construction
Division of TVA, which has desi
the plants for construction and s
vised the purchase of all of the
struction machines for the various d
is getting a big hand for the work i
done. The scheme of doing the
construction plant planning for all
projects at a central point has wo
out to the satisfaction of even
who were opposed to the idea wh
was started in the early days of
Capable designers, familiar with
equipment owned by the TVA, and
as familiar with the entire constru
equipment market, were able to gi
individual job the advantage of sp
ist help. Perhaps most importa
all was the fact that the constru
plant division was made up most
engineers, who had previously w
with contractors and understood
necessity for giving the "job" the
of plant they wanted but with d
worked out for most rapid oper

Municipal affairs

A building code for the city of K
ville, compiled by the Technical S

Concrete placed only at night on TVA's Fontana Dam

ana Dam, built by the Tennessee Val- thority in western North Carolina, ches completion as mass concrete s roadway level in several blocks. This l night view shows only one of the mmerhead cranes used in the concrete g operations. One had been dismantled the picture was made, and the other een taken down since, indicating the of the project. Concrete is now being placed only on the night shifts to make the remaining cranes available for other work in daylight.

The dam, largest east of the Rockies and fourth highest in the world, will contain 2,800,000 cu. yd. of concrete and will be more than 470 ft. high above foundation rock. The hammerhead and whirley cranes are operating on what is known as the high-level trestle. The same trestle was used at midheight of the dam for the first stage.

Closure of the low-level outlets and start of filling of the reservoir is scheduled for Nov. 1. Two 91,500-hp., 75,000-kva. units are being installed initially with space provided for a third unit. Design and construction is being done by TVA's own forces. F. C. Schlemmer is project manager; Oren Reed, construction engineer and G. E. Murphey, construction superintendent.

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oxville and the local chapters of merican Institute of Architects and Associated General Contractors of ica, is now in the hands of the er. The revised code provides for f newly developed materials and porates a procedure by which ma- s may be submitted for approval subsequent use as they become ble in the postwar period.

oxville has plans for a new water- highway along the Tennessee to be built possibly on a covered e fill. It is believed that the direct objection can be taken care of mediate cover, but the possibility er pollution from hydrogen sul- , generated from surface water ng through the refuse, will require study.

llution of the Tennessee River is a s problem. About 600,000 people along the Tennessee, but sewage treatment, of any sort, is provided for only 40,000. Industrial waste, with a population equivalent of 1,300,000 people, is dumped into the stream. Much of it is from pulp and rayon manufacture and is difficult and expensive to treat. TVA is cooperating with city and state health departments and with manufacturers to find ways and means of reducing pollution.

TVA on the march

Resale of electricity under TVA established rates has proved profitable to both the cooperatives and the municipalities that purchase TVA generated power. As postwar projects, several of the quasi-public organizations contemplate extensions of rural lines and construction of new buildings out of surplus. Some of the organizations that have been distributing TVA power the longest have reduced their residential electric rates to well below the TVA basic rate—100 kwh. at 2c, the next 250 kwh. 1c, and the next 700 at 0.4c. This makes the first 1,050 kwh. 0.73c and all in excess of this is 0.7c. per kw. Basic TVA rates start at 3c and reach a minimum of 0.75c per kwh.

Reflecting the interest of the world in the TVA experiment, negotiations are underway for translation of Chairman Lillienthal's book *Democracy on the March* into Italian, Portuguese, Hebrew and Chinese; a low cost edition is being printed in England, and orders for 1,000 copies at a time of the U. S. edition come from Australia. The Tennessee Valley Authority constantly is host to foreign engineers studying water utilization and regional development and a few engineers from China are spending several months in the Valley, studying all phases of the design and construction.—*H. W. H.*

News of the Engineering Schools

Frederic T. Mavis has been appointed professor and head of the department of civil engineering at Carnegie Institute of Technology, Pittsburgh, Pa., to succeed Prof. F. M. McCullough, who has retired. Mr. Mavis has held a similar position at the Pennsylvania State College since 1939.

His graduation from the University of Illinois in 1922 was followed by a period of professional practice with Kelker, DeLeuw and Co., consulting engineers in Chicago. Awarded the John R. Freeman traveling fellowship of the American Society of Civil Engineers, he spent the year 1927-1928 in Europe studying hydraulic engineering. From 1928 to 1939 he was on the staff of the State University of Iowa, serving some time as associate director in charge of the laboratory of the Iowa Institute of Hydraulic Research and as professor and head of the department of mechanics and hydraulics. Mr. Mavis has written and edited numerous papers and monographs in hydraulics, hydrology, and structural engineering.

An effort to formulate a description of the ideal engineering school graduate—as an engineer and as a citizen—for use as a basic guide in attacking the problems of postwar engineering education is being made at the Cooper Union School of Engineering, New York, it is announced by Dean George F. Bateman.

A faculty committee under the chairmanship of Louis M. Heil has been appointed to make a comprehensive study of the type of engineer the institution should endeavor to produce. This committee will consider not only the student's training in engineering, but also his ability to take his proper place after graduation as a valuable member of society.

The committee hopes, Dean Bateman said, to prepare a set of "specifications" which will describe the graduate in terms of all types of educational experience, rather than in academic requirements alone.

The project has been undertake the belief that too many specialized jects have found their way into the ventional engineering school progr leaving too little room for neces foundational subjects.

H. G. Baity is expected to arrive f Brazil this week to resume his du as head of the sanitary engineering department of the Graduate School of Public Health, University of North Carolina. Dr. Baity has been on leave of absence from his post for almost two years, during which he has been serving as chief engineer associate chief of party in Brazil the health and sanitation division of Office of the Coordinator of In American Affairs.

In Brazil Dr. Baity has his headqu ters in Rio de Janeiro, but he sp much of his time in the field direct the installation of sanitation facili and construction of health centers some remote parts of the country.

Restrictions relaxed on house remodeling

For the first time since the War Production Board clamped wartime restrictions on construction, that body will now permit one type of construction, in designated areas—which need not be war industry areas—without limit as to extent of work or dollar value. The new ruling covers remodeling and conversion of large apartment and dwellings to provide more small housing units in areas where the National Housing Agency finds an extreme housing shortage exists.

New York City is the first to be so designated, and it already has conversion applications on file with NHA. Despite that city's loss of wartime population, an acute shortage of middle-rent apartments is said to exist. This shortage could not be met under WPB restrictions, because the need was not for war workers.

Washington, D. C. is expected to be the second city to be named. NHA officials will make no estimate of how many areas will prove to be eligible for the unlimited conversion program, the number of buildings or units affected, nor the dollar value of the remodeling. They do say, however, that many thousands of new units may result.

Before an area can be designated as having an extreme housing shortage, it must be cleared with the Areas Production Urgency Committee of WPB. Thereafter, individual applications to remodel must be made on WPB Form 2896 and filed with the nearest FHA office. Approval of the application carries with it an AA3 priority rating, which WPB holds is in general sufficient for most materials required. Rents for the new units will have to be approved by the Office of Price Administration. The new program is designated H-3, under which housing heretofore has been permitted only to relieve individual cases of hardship.

Except in the areas approved by NHA, the provisions of WPB construction order L-41, limiting construction on a dwelling unit in any calendar year without WPB authorization to $200, and with a $1,000 limit for an apartment building to house six families, still apply.

◆

Employment of ten additional engineers to assist in designing the water board's $20,000,000 postwar program was approved by the Detroit, Mich., city council, recently. The engineers are needed to expedite the planning now being done on parttime by most of the board's 53 regular engineers.

N. Y. City to spend $400 million in 1945

(Continued from page 67)

The last official barrier to wide-spr conversion of large New York ap ments and old tenements into ba needed living quarters was removed t week when Charles S. Ascher, regio head of the National Housing Agen designated the city as an area of "cr cal housing shortage."

Mr. Ascher's order embraced the city boroughs and Nassau County. followed by only a day the announ ment of the War Production Board t it would authorize resumption of modeling work by private owners, only in communities where the NH decreed there was a pressing need additional housing (see report at lef This was believed to be the first a in the nation so designated.

On a twelve-acre site in Harl overlooking the Harlem River, Metropolitan Life Insurance Co. planning to erect a modern residen community for 1,200 families. The n development is to be known as Riv ton.

No estimate of the cost was ava able, but realty and building expe figured that the structural investm alone would amount to $5,000,000.

FWA survey shows lag in postwar works plans

(Continued from page 67)

r the preparation of highway plans on 50-50 percent matching basis. State overnments also indicated that much chool and hospital construction is conmplated, while work being planned by rge metropolitan areas includes nuerous sewer, water and sanitation jobs. small areas, schools ranked high in e type of work which is now being ntemplated.

Data obtained as to available funds carry out the proposed projects reealed that money is available or obtainle from local sources for one-fourth f the projects for which plans are comleted. Replies indicated further that, r nearly another quarter of the projcts, the probable source of funds would e taxes, service charges and licenses. Borrowing was anticipated in only a few ases. Many reports indicated that the ource of funds was unknown or that the gency was hopeful of federal aid.

Legislation and funds needed

The failure of the cities of under 25,00 population to complete plans was xplained, in the majority of cases, by he lack of either funds or legislative uthority, or a combination of both. For xample, 27 state governments and 53 ities of over 100,000 population are in his predicament. In only four states, amely, New York, California, Michigan nd New Jersey, has legislation been assed to provide state funds to aid ounty and municipal governments on lanning, says the report.

The Federal Works Agency, for which Maj. Gen. Philip B. Fleming is adminstrator, made the report for the special ommittee on postwar planning of the House of Representatives. This comittee, known as the Colmer committee, equested the survey to better evaluate eneral Fleming's view that satisfactory nancing methods for postwar planning ust be made available to many local overnmental bodies if they are to preare plans.

General Fleming recommended to the ommittee a few months ago that a 200,000,000 planning fund should be rovided by Congress for this work, ome of the money to be spent as grants n a 50-50 matching basis, but the major roportion to be distributed as loans or dvances, to be repaid when the work is onstructed. After making a study of he findings of the survey completed last eek, General Fleming still believes hat a substantial federal fund is needed o increase the tempo of postwar planing to the rate desired in order to get he best results.

JOBS OF THE WEEK

RETAINING WALL, Michigan

Sunswick Corp., New York, N. Y., has been awarded a contract by U. S. Engineers, Detroit, Mich., for a retaining wall, at Sault Saint Marie lock at an estimated cost of $1,000,000.

BRIDGE, California

California State Division of Highways, Sacramento, Calif., received low bid of $727,858 for reconstructing a portion of existing bridge across the Sacramento River, at Rio Vista, from Lord & Bishop, and A. Teichert & Son., Inc., Sacramento, Calif.

RECYCLING PLANT, Katy, Tex.

Hudson Engineering Co., Houston, has been awarded a contract for the design and construction of a recycling plant addition for the Humble Oil & Refining Co., Houston, Tex. The estimated cost is $700,000.

STOREHOUSE, Williamsburg, Va.

Bureau of Yards & Docks, Navy Department, Washington, D. C., awarded a contract for constructing storehouse, shed and storage building, at Naval Supply Depot, to Virginia Engineering Co., Inc., Newport News, Va., at $2,470,000.

BARRICADES, Merrimac, Wis.

Graham Paving & Construction Co., Chicago, Ill., was lowest bidder at $645,838 for barricade construction at Badger Ordance plant, for U. S. Engineers, Milwaukee. Mason & Hanger Co., New York, N. Y. is engineer and architect.

Note—Additional bidding and contract news on many projects large and small appear in the Construction News section beginning on page 181.

Low bids announced for Chicago filter plant

Low bids were received on Sept. 13 covering construction of the superstructures of the filtration and administration buildings at Chicago's South District filtration plant, according to W. W. DeBerard, city engineer. An attempt was made last July (*ENR*, July 20, vol. p. 62) to let a contract for this work, based on anticipated priorities of necessary materials, but no contract was awarded at that time due to the confusion among bids received covering the several alternate materials involved in the undertaking.

Priorities on all necessary materials now have been acquired and the work has been divided into four units to expedite the awarding of contracts. A total of 13 contractors, all from the Chicago area, submitted bids on the various divisions of the work, the largest of which includes reinforced concrete and masonry construction, ventilation, and electrical and architectural work. The three low bidders for this work are: S. N. Nielsen Co., $1,497,000; Gust A. Newberg Construction Co., $1,528,700 and W. E. O'Neil Construction Co., $1,534,590. Low bids of $82,120 were submitted by Robt. Gordon covering heating facilities and equipment, and $13,250 for piping. W. T. Mahoney & Sons' bid of $49,600 was low for the plumbing, sewers and drains.

Hays in Palestine on irrigation surveys

James B. Hays is now in Palestine in connection with proposed work on irrigation and flood control projects in that country. The work is under the direction of a privately-financed group known as the Commission on Palestine Surveys (*ENR* May 25, 1944, p. 772).

Some 900,000 ac. ft. of storage is proposed at three main dams with 450 miles of principal feeder canals. At present Palestine depends on dry farming. It is said that three times the present population of 1,500,000 can be supported in the country under the proposed irrigation plan.

Mr. Hays will investigate the proposed dam sites and make preliminary studies and plans in cooperation with engineers in Palestine. He has been with the Commission on Palestine Surveys for more than a year, working in this country on advance planning. Hays formerly was construction engineer for the Tennessee Valley Authority at Chickamauga and Kentucky dams and before that was with the Bureau of Reclamation on irrigation work.

OBITUARY

Edward H. Heinneman, assistant to the regional director for the Bureau of Reclamation at Amarillo, Texas, died Sept. 10. Mr. Heinneman, a graduate of the University of Denver, had worked on the Boulder Dam, on the Central Valley project, and in Washington, D. C.

Mark L. Reed, Jr., 40, Asheville, N. C., contractor, died Sept. 6. President and treasurer of Reed and Abee, Inc., contractors, Reed was widely known for office buildings he had constructed throughout North Carolina.

John P. Cullen, 77, a leading general contractor in Wisconsin died Sept. 4 at Janesville. He had many large contracts in Wisconsin, Indiana, Iowa, North and South Dakota, Nebraska, Illinois, and Florida. He served two years as president of the Wisconsin Constructors, Inc., and two terms as president and later director of the Wisconsin chapter of the Associated General Contractors of America.

James Page, 79, a retired consulting engineer at one time connected with the Port of New York Authority, died in Baltimore, Md., Sept. 11. After his graduation from Johns Hopkins in 1882 Mr. Page took special courses at Massachusetts Institute of Technology. He prepared publications for the United States Hydrographic Office, 1893-1905; was chief of the division of ocean meteorology of the United States Weather Bureau, 1907-08; and chief engineer of the water supply and sewer system of Cienfuegos, Cuba, 1908-12.

Payton M. Marshall, 55, Houston, Tex., contractor since 1905, died at Houston, August 31. He built and remodeled many Houston buildings.

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Big new naval hospital for San Francisco area

Plans for the early postwar construction of a $6,500,000 permanent hospital in the San Francisco Bay area were announced recently by Twelfth Naval District headquarters in San Francisco.

The hospital will be a 1,000-bed, fireproof concrete or brick structure comprising 12 main buildings and six subsidiary buildings, and will require a 100-acre site. Naval authorities said the hospital probably will be located on the west side of the bay in proximity to the U. S. Naval drydocks at Hunter's Point.

A.S.C.E. field secretary named on Pacific coast

H. L. Thackwell of Pasadena, Calif., has been named field secretary for the American Society of Civil Engineers to serve the eleven Western states and Texas. For the present Mr. Thackwell will make his headquarters in Pasadena.

Appointment of a field secretary who would be resident on the Pacific Coast was authorized by the Board of Direction of the society some months ago in order to give the members in that region closer contact with the secretarial staff, and to make available to the local sections and student chapters the services of a member of the staff on questions arising in connection with matters in which the society is currently interested, such as collective bargaining.

Mr. Thackwell has been in engineering work in the Southwest and Latin America for the past 30 years, specializing largely in sanitary engineering.

MEETINGS

National

American Public Works Association, annual congress, Hotel St. Paul, St. Paul, Minn., Sept. 24-27.

Institute of Traffic Engineers, 15th annual meeting, Sherman Hotel, Chicago, Ill., Oct. 1-4.

American Public Health Association, second wartime public health conference and 73rd annual business meeting, Hotel Pennsylvania, New York, N. Y., Oct. 3-5.

Federation of Sewage Works Association, annual meeting, William Penn Hotel, Pittsburgh, Pa., in conjunction with 17th annual conference of the Pennsylvania Sewage Works Association, Oct. 12-14.

International City Managers' Association, annual conference, Medinah Club, Chicago, Ill., Oct. 12-17.

American Welding Society, 25th annual meeting, Hotel Cleveland, Cleveland, Ohio, Oct. 16-19.

Society for Experimental Stress Analysis, fall meeting, Carter Hotel, Cleveland, Ohio, Oct. 17-20.

Engineers' Council for Professional Development, 12th annual meeting, 29 West 39th St., New York, N. Y., Oct. 20-21.

American Municipal Association, annual conference, Hotel Blackstone, Chicago, Ill., Oct. 25-27.

National Council of State Boards of Engineering Examiners, annual meeting, Hotel Lafayette, Lexington, Ky., Oct. 30-31.

American Institute of Steel Construction, annual meeting, Atlantic City, N. J., Oct. 31-Nov. 2.

Highway Research Board, annual meeting, Netherlands Plaza Hotel, Cincinnati, Ohio, Nov. 22-25.

Regional and Local

North Carolina League of Municipalities, 36th annual conference, Winston-Salem, N. C., Oct. 4-6.

Georgia Water and Sewage Association, 13th annual meeting, Georgia Institute of Technology, Atlanta, Ga., Oct. 5-7.

Southwest Section, American Water Works Association, Stephen F. Austin and Driskill Hotels, Austin, Texas, Oct. 17-19.

Missouri Valley Section, American Water Works Association, Hotel President, Kansas City, Mo., Oct. 23-24.

California Section, American Water Works Association, annual meeting, Hotel Biltmore, Los Angeles, Calif., Oct. 24-26.

West Virginia Section, American Water Works Association, annual meeting, Hotel Chancellor, Parkersburg, W. Va., Oct. 26-27.

Engineers' Society of Western Pennsylvania, 5th annual water conference, William Penn Hotel, Pittsburgh, Pa., Oct. 30-31.

Carolina Branch, Associated General Contractors of America, 24th annual meeting, Carolina Hotel, Southern Pines, N. C., Oct. 30-31.

WEEKLY CONSTRUCTION SUMMARY

CONTRACTS

Continental U. S. Only
(Thousands of Dollars)

		Week Ending	
	Sept. 23 1943	Sept. 14 1944	Sept. 21 1944
Federal	$54,094	$27,436	$9,883
State & Municipal	8,366	8,041	4,955
Total public	$62,460	$35,477	$14,838
Total private	9,491	6,993	4,397
TOTAL	$71,951	$42,470	$19,235

Cumulative
1944......(38 weeks)......$1.348.716
1943......(38 weeks)......$2.437.651

Note: Minimum size projects included are: Waterworks and waterways projects, $15,000; other public works, $25,000; industrial buildings, $40,000; other buildings, $150,000.

NEW PRODUCTIVE CAPITAL

	Cumulative	
	1943 38 Weeks	1944 38 Weeks
NON-FEDERAL	$276.461	$346.555
Corp. Securities	17.408	96,045
State & Mun.	98.920	109.720
RFC Loans	9.000	57,790
FPHA Loans	8,133	....
REA Loans	20.000	20,000
Fed.-Aid Hwy.	128.000	63,000
FEDERAL	$2.753.838	$1,263,800
TOTAL CAPITAL	$3.030,299	$1,610,355

ENR INDEX NUMBERS

Index base=100		1913	1926
Construction Cost	Sept. '44	300.46	144.48
Building Cost	Sept. '44	236.00	127.57
Volume	Aug. '44	121.	53.

Comment and Discussion

Readers' opinions on matters that concern engineers and contractors

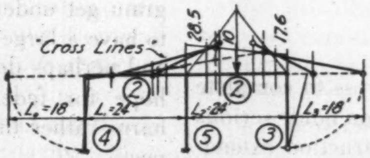
Moment Balancing

Sir: In the paper "Moment Distribution by Linked Rigidities", (*ENR* June 1, 1944, vol. p. 802), D. B. Steinman has shown a most interesting graphical method for moment distribution. However, a greater speed in distribution of moments may be obtained with the graphics termed "three line polygons" and "cross lines", as illustrated in the accompanying sketch.

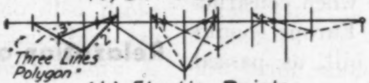
The inflection points on the member axis are determined with line 2 drawn through the stiffness ordinate at the support and one-half basic stiffness at the third point of span, sketch (a). The stiffness ordinate at the support represents the stiffness of support as determined with line 1 drawn through the inflection point at the far end and one-half basic stiffness at the third point of the span. The basic stiffness is the ratio of the moment of inertia to the span length, I/L. The basic stiffnesses are shown in the circles sketch (c).

The elastic points on the member axis are determined with "three-line polygons", sketch (b). Line 2 in sketch (b) is the same as that shown in sketch (a). Line 1 is drawn through the inflection point at the far end and the stiffness ordinate at the support. Line 3 is drawn through the intersection point of line 1 with the vertical at the third point of the span and one-half basic stiffness at the third point in the following span. The intersection point of line 3 with the member axis is the elastic point.

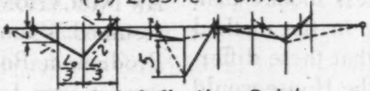
The closing line in the moment diagram in sketch (c) is drawn through the closing points on the inflection point verticals determined with the "cross lines". The cross lines are constructed on the central moment ordinates. The inflection points and the central moments in the haunched beams are determined with constants given in the booklet entitled, "Analysis of Continuous Frames by Graphical Distribution of Moments", published by the writer.



(c) B.M Diagram



(b) Elastic Points.



(a) Inflection Points

Distribution of moments in the accompanying sketch is entirely graphical, and the procedures are not increased in geometric proportion to the number of spans.

A. A. Eremin,
Associate Bridge Engineer,
California State Highways,
Sacramento, California

Air in Concrete

Sir: The editorial "Toward More Durable Concrete" (*ENR*. Aug. 24, 1944 vol. p. 213) contains the statements quoted below which appear to the writer to be an example of the confused comprehension of air-entrainment in concrete:

"If strength is not to be seriously affected air should not greatly exceed 3 percent; in other words unit weights should not be reduced more than from 148 to about 143 lb. per cu. ft. And where it is important to avoid loss of strength the mix should be redesigned by reducing both sand and water content by about the volume of the added air, thus in effect reducing the water-cement ratio."

It is important in discussions of the air content of concrete to distinguish clearly between air-content, per se, and what is referred to as "added air" in the editorial. Concrete made with plain cement may contain air in amounts varying from slightly less than 1 percent to as much as 3 percent. Generally, the air content of concrete, having a normal cement content, is between 1.5 and 2 per cent. Therefore, it would be an inadequate use of the potentialities of air-entraining cement to require that "air should not greatly exceed 3 per cent". Actually, it has been concluded by most investigators that the *added* air need not greatly exceed 3 per cent to realize the potential advantages of this type of cement. This would bring the total air content close to 5 per cent.

In this connection, attention is invited to the statement in Appendix 1 to the Annual Report of A.S.T.M. Committee C-1 on Cement for 1944 (preprint No. 41, p. 70) that "extensive field experience and laboratory tests have shown that an air content in concrete of 5 to 6 per cent is the optimum for obtaining maximum workability, bleeding reduction, and durability with a minimum of strength reduction". That statement was written by this writer with the firm belief in the old axiom that one cannot have his cake and eat it, too. Strength need not be sacrificed greatly, if at all, but the object in using air-entraining cement is to obtain the properties peculiar to its use. If strength of test specimens is of greater importance, plain cement should be used.

Issue is taken, too, with the use of the word "re-design" with regard to mixtures containing air-entraining cement. All concrete mixtures should be *designed* with the materials to be used on the project, including the particular brand and type of cement whether or not "loss of strength" is to be avoided. It is true and important that air-entraining cement mixtures will possess appreciably lower sand and water contents if properly designed in optimum proportions than would mixtures of similar workability containing a similar amount of plain cement, but this is not accomplished by "re-design".

Your very truly,

Charles E. Wuerpel,
Engineer-in-Charge U. S. Central Concrete Laboratory,
Corps of Engineers,
Mt. Vernon, N. Y.

Editor's Note—The air referred to in the editorial was "added air" as the reference to reduction of unit weight shows. It would have been better to have said so more definitely. "Re-design" is probably what everyone will do the first time he uses the new cements, but Mr. Wuerpel is right in insisting on explicit terminology.

EDITORIALS

VOLUME 133 NUMBER 12

September 21, 1944

Compromise Needed

THE CONTINUED FAILURE of Congress to complete action on postwar highway legislation holds serious threat of set-back to highway construction extending many months beyond the time when construction can be resumed if the war in Europe should end soon. The amended Senate bill, as passed last week, now carries somewhat less money than the House bill, and the two differ in the method of apportionment. It would seem that these differences could be adjusted quickly if the House would act on its bill, but that body has put all such things aside until after election. If Congress, when it reconvenes, is preoccuped with war legislation or reconversion, there may be further weeks of delay, thus leaving the states in uncertainty at the time their own highway legislation should be in preparation. Responsibility for this condition is not entirely the fault of Congress. A considerable part rests with the state highway authorities for their failure to agree on what they would ask from Congress in the way of postwar highway legislation. All of which means state highway officials can help speed action by Congress by not being too insistent in demanding that their particular ideas be written into the final law.

Subsidies for Local Work

NEW YORK CITY, according to Mayor LaGuardia, has $400,000,000 of postwar work ready to put under contract in 1945 should the war end—provided the federal government will put up half the cost. From what has been said recently in Congress with respect to curtailment of non-war expenditures the prospect for federal aid, other than for highways and perhaps for low cost housing, appears remote indeed. More basically, however, local postwar construction, to be effective in quick relief of possible unemployment, should be independent of federal aid. Hence it seems unfortunate that New York, which has set such a splendid example in getting plans in shape for an early start, should take the lead in asking Congress for large grants, thus in effect passing control over its program to the federal government. Obviously, any community that asks for and accepts a large federal grant must also accept a large measure of federal control. That means another big PWA organization and all the delays inherent in remote control from Washington. New York has $150,000,000 of work, which can be put under way without a subsity. Better to have this really substantial program get under way without strings attached than to have a large program dominated by Washington and perhaps delayed by it. New York's expressed hope for federal aid, if pushed too hard, can harm rather than help postwar construction prospects.

Relaxation of Restrictions

AN INDICATION of how normal construction may be resumed is found in the announcement of the War Production Board that restrictions on house conversion are to be lifted in areas where there is a critical shortage of housing to permit the conversion of large houses and apartments into smaller units. A considerable amount of construction composed of many relatively small operations can be put under way in this manner, thus giving WPB a measure of the effect of such relaxation on war activities. Indeed it could go farther and permit other types of small jobs—culverts, water and sewer line extensions, street paving and the like—to go ahead. They require a minimum of transportation service and special material, and, moreover, can give employment quickly in a large number of widely-scattered communities. If no effect detrimental to the war effort develops, then further relaxation should be possible. The immediate result of such minor relaxation of restrictions on construction may not be apparent, but it will have the cumulative effect of getting more and more contractors back into action, thus facilitating a more rapid expansion of the larger jobs when the time comes to lift restrictions completely.

Transportation Trends

CONSTRUCTION OF A UNION TERMINAL for over-the-road freight trucks in New York City after the war, as proposed by the Port of New York Authority, is indicative of a trend in freight handling that should result in much more construction of a like nature in the postwar period. The Port Authority's new truck terminal is designed to save a large amount of cross hauling by trucking companies just as its big offrail freight terminal built several years ago was designed to reduce the unnecessary hauling of part loads from Manattan to rail terminals in New Jersey. The Port Authority plans similiar union truck terminals in New York City and in adjacent New Jersey based n studies now being made. Like union truck facilities could be used to advantage in other cities.

arthquake Lessons Repeated

HE PICTURE OF ROOF PARAPET and cornice maonry piled across the entrance to the Cornwall Ont., school, published last week in our report of he Sept. 5 earthquake, has a startling resemlance to those published following the Long Beach, Calif., quake of 1933. Such similarity is—or hould be—disconcerting, and it can also prove ortuitous. That schools and other buildings are till being topped-out with unstable masonry is ause for anxiety, as is the realization that an arthquake sufficiently strong to throw down parapets, cornices and plaster in wholesale manner has ccurred in the Northeastern United States and djacent parts of Canada. The fortuitous element f the similarity to damage in the Long Beach uake (and to that incurred in 1925 at Santa Barbara, too, for that matter) is that an awakening especting earthquake-proof design may ensue, similar to that which took place in California.

If design changes to make structures reasonably esistant to earthquakes were either extensive or xpensive there would be more excuse for the existng situation. They are neither, however, and to nchor parapets and cornices sufficiently to resist he horizontal forces of the great majority of earthuakes involves not much more than should be one to take care of a reasonable wind load.

It is to be hoped that the extensive damage at Cornwall may cause Easterners to look with a ittle less complacency and self satisfaction on heir "safer" location as compared to the West Coast, even though the record so far may favor at belief. Earthquakes "can happen here", and re happening every year. Someday one will ocur when school is in session, and children will be rushed by falling masonry. Engineers and archiects should not wait for such a tragedy to cast oubts upon their abilities.

Anchor parapets, or don't use them. Provide easonable resistance to horizontal forces in founations, frames, floors and walls. These are the essons that all earthquakes have emphasized, and his latest one merely repeats them.

A Two-Fold Objective

PARTICIPATION of the United States government in the development of industrial and other resources of South America has given rise to frequent expressions of concern in this country. Principal cause of alarm is the belief that our financial loans and other aids directed toward foreign industrialization will destroy markets for many goods that are now exported from the United States. Quite conceivably, such ideas may be generated by a reading of the article on Peru's industrialization of the Chimbote Bay region (page 96). Further reflection, however, will reveal that the United States stands to gain by extending a helping hand to countries like Peru, where strenuous efforts are now being made to improve economic conditions.

For example, when Peru has completed its iron and steel plant it will be in a position to produce rails, reinforcing bars and cast iron pipe, which are now imported at high prices because of shipping charges. The dollar exchange thus freed should then be available for the purchase of more expensive steels and finished products whose dollar value is high in comparison to weight. Furthermore, production of heavy-tonnage iron products in Latin-American countries can hardly be considered a threat to our export business because in the past much of this was supplied by Europe anyway. Likewise, in connection with the development of hydroelectric power facilities, any aid that we contribute should result in almost immediate benefits to exporters of electrical equipment and certain types of consumer products.

Another, less tangible, benefit from promoting higher standards of living in South America, is the contribution that this will make in the establishment of more stable governments and future world peace. It is axiomatic that when the living standards of a people are being improved, the likelihood of dissatisfaction with the government that provides such benefits is largely eliminated. A final argument that favors our support of industrial developments in the countries south of the border may be drawn from our past experiences in foreign trade, viz., that our best customers are also our biggest competitors.

In many respects, the engineering and financial aid we may give to Peru might well be considered a selfish strengthening of our foreign markets as well as a contribution to hemispheric solidarity.

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ENGINEERING ABROAD — AS SEEN BY ENR EDITORS

Steel-Paved Steps to Tokyo

H. W. Richardson
Western Editor, Engineering News-Record

Contents in Brief*—*The northern road to Tokyo follows the 2,000-mile sweeping curve of the Alaska Peninsula and the Aleutian Islands. Along this road the armed forces have built a series of airports on the barren Arctic tundra that form aerial stepping stones to the Nip homeland—steel-paved steps that are surfaced with steel plank mat. This steel paving has made fast construction of the airfields possible. As the task forces moved westward, island by island, each conquest brought new problems in runway construction. At Adak the field was built in a tidal swamp closed off from the sea by a sand dike; at Amchitka the strip was built under enemy bombing.

FROM THE MAINLAND OF ALASKA, down the narrow curving length of the Alaska Peninsula and on out to the far end of the chain of bleak Aleutian Islands the armed forces are building a series of airports—a 2,000-mile military lifeline. The landing strips are hard surfaced as far westward as the middle of the peninsula. But from there on they are mostly steel mats—one of the war's miracle products—for they are being built in a hurry far from sources of materials and equipment.

These fields are an extension of the airport network in the interior of Alaska and the southeastern panhandle. They were started for the defense of the mainland, carried ahead for clearing the Japs out of the Aleutians, and now stand as steel-paved steps to Tokyo. Already the north end of the Nipponese empire at Paramushiro has been bombed from Aleutian bases.

Army, Navy and civilian job

Contractors, Navy Construction Battalions and Army Engineer troops have all participated in building the Alaska-Aleutian airport network. In the interior of Alaska and along the seacoast fringe of the mainland several fields were contractor-built for the Civil Aeronautics Authority as a peace-time operation. When Alaska became a vital defense zone the army engineers took over many of the CAA projects, improving some by contract, others by engineer troops. Then the army went ahead with other airports, again letting some by contract and building others with troops.

In August, 1940, with the start of defense construction in this country, the army engineers moved into Annette Island, near Ketchikan, Alaska, to build the first big air base for the protection of the Alaskan coastline. When this was completed, they moved further up the coast to Yakutat, on a similar project. Mud, deep, sticky, endless mud, soaked by the Alaskan coastal rains that total 180 in. per year, and churned up by scrapers and other dirt-moving equipment, proved to be the biggest difficulty in building these two bases. Eventually they were completed, with concrete-paved strips, and the engineers moved on westward.

Meanwhile, the Navy was at work on its three principal Alaskan bases—Sitka, Kodiak and Dutch Harbor. At first all the navy work in this territory was done by contract, but in the summer of 1942 the contracts were terminated and the work was taken over by the Seabees. Each naval base includes landing strips for both land-based and amphibious planes. In addition to the airports at the bases, the army built substantial supporting airfields nearby.

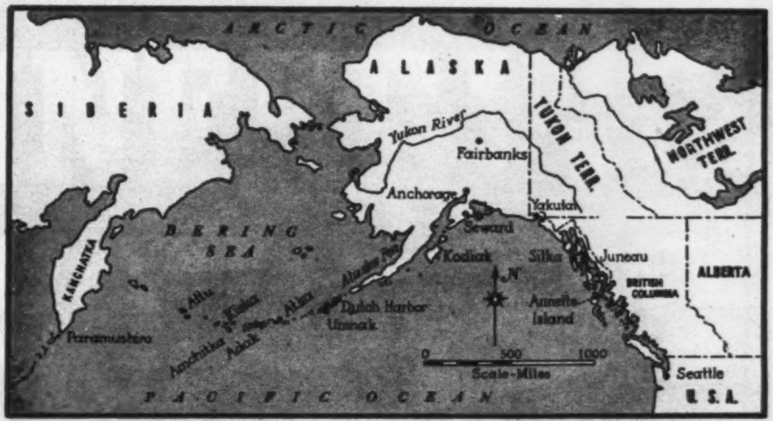
The supporting field for Dutch Harbor played an important part in thwarting the Jap attack on that base in June, 1942. Because of the ruggedness of Unalaska Island, upon which Dutch Harbor is located, the next island westward, Umnak, was selected as the site for the auxiliary army base.

Surprise for the Japs

Construction work at Umnak was kept secret, and at the time of the Jap attack on Dutch Harbor had been completed far enough to accommodate a fighter squadron. When the Jap struck with a superior force, land-based planes from Umnak came to the rescue. The Nips were so surprised to see planes attacking them from the west that, after getting in a few damaging blows, their fleet turned tail and ran westward, finally landing forces at the unoccupied island of Kiska, Aggatu and Attu at the far end of the Aleutions. It took us 15 months to clear the enemy off these last islands.

As part of the air route from the mainland to the islands the army built three substantial fields at Naknek, Port Heiden and Cold Bay along the north side of the long Alaska peninsula. Some of the engineer troops that slashed the pioneer road of the Alaska Highway through the wilderness participated in the construction of these facilities.

From Umnak we continued to move estward with the Aleutian defense. The next stop, Aug. 31, 1942, was at dak, destined to become the center f Aleutian activities. A month later e dropped back to Atka to build an termediate airport. On Jan. 12, 943, the first major move to drive e enemy off the islands was made y a landing at Amchitka Island, only 2 miles southeast of Jap-held Kiska. fter the Adak and Amchitka strips ere completed planes for these bases stematically bombed Kiska and ttu. Our successful invasion of Attu arted May 11, 1943 (*ENR* Dec. 30, 943, vol. p. 492). The taking of Attu d completion of an airport there ermitted our forces to squeeze Kiska rom two directions. Such pressure ecame too hot for the Japs on Kiska, d they evacuated the island a few ays prior to our invasion on Aug. 5, 1943, bringing to a close the forts to clear the enemy from the leutians. So much for a brief resume f the tactical operations.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The north road to Tokyo follows the Alaska Peninsula and the curving chain of the Aleutian Islands. The Jap base at Paramushiro has been bombed.

Pierced plank paving

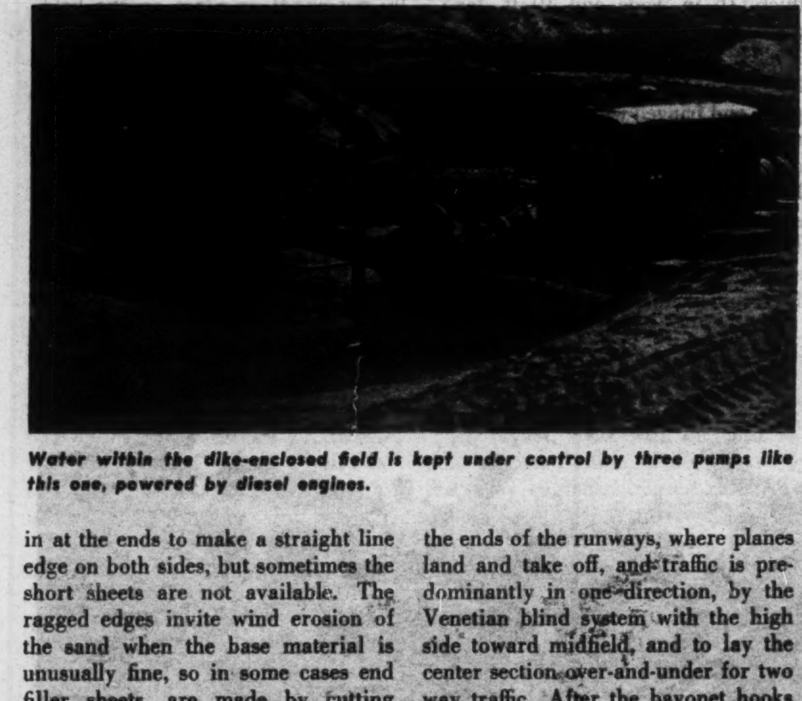
The Seabeas helped build the Um-ak airport, and are working with the rmy on a landing field at Attu, to be ed jointly by the army and navy. lsewhere in the western Aleutians e airports are being built by army gineer troops.

One material alone made possible e fast construction of these outpost airports—steel mat surfacing. Several types of steel mat have been developed but that known as pierced plank has been found most suitable for Aleutian conditions. This type consists of steel sheets about ⅛ in. thick, 16 in. wide and 10 ft. long, pierced by three rows of cupped holes 3 in. in diameter, stiffened with two longitudinal ribs pressed into the plate, and fringed with a series of slots and bayonet hooks, the latter bent downward at a 45-deg. angle. These hooks engage the slots of adjacent sheets when over lapped about 1 in., forming a tight, smooth interlocked steel mat that is substantial and durable, well liked by the pilots because of its smoothness and because they can make belly landings on the mat in emergencies with a good chance of walking away from the disabled ship.

The sheets weigh 65 lb. apiece, (easily handled by two men) or 5.2 lb. per sq. ft. in place on the field. Usually the mat is laid on a sand base, for on most of the islands is found a fringe of dunes of volcanic sand which supply this needed material. In general, the sheets are laid transverse to the long axis of the runway with joints staggered. Staggering the joints leaves alternate rows of sheets either 5 ft. too long or two short. Usually each shipment includes a number of half-length sheets to fill

Steel plank runway surfacing is laid in fast time by experienced engineer troops using only simple tools.

Timber tide gate keeps out the sea at high tide, drains off the dike-enclosed field at low tide for an unusual airport on Adak.



Water within the dike-enclosed field is kept under control by three pumps like this one, powered by diesel engines.

in at the ends to make a straight line edge on both sides, but sometimes the short sheets are not available. The ragged edges invite wind erosion of the sand when the base material is unusually fine, so in some cases end filler sheets are made by cutting standard lengths in half with arc welders.

The sheets are overlapped in two different ways. One, known as the Venetian blind system, is to lay one edge on top of one adjoining sheet and under the sheet on the other side. The second method, called "over-and-under" is to lay alternating rows on top of both adjoining rows. Experience proved the best method is to lay the ends of the runways, where planes land and take off, and traffic is predominantly in one direction, by the Venetian blind system with the high side toward midfield, and to lay the center section over-and-under for two way traffic. After the bayonet hooks are inserted into the slots of the adjacent sheets the newly-laid steel plank is shoved endwise to fully engage the hooks. Two spring clips are then pounded into two slots in each sheet to keep the hooks from backing out.

At one runway the Air Corps requested the sheets be laid longitudinally with the idea that perhaps the surfacing would be smoother for small planes. However, the big bombers caused the sheets laid in this manner to warp and buckle, so it was necessary to tear up the runway and relay the plank transversely, after which no further trouble was experienced.

The sand base, built with scrapers and bulldozers, is leveled off by dragging with scrapers when the material is dry, by road graders when wet, followed in each case by dragging with timbers pulled by tractors. Final finishing, just ahead of laying the steel sheets, is by hand shovels and rakes. After laying, the holes in the steel plank are filled in by spreading sand over the mat with hand shovels. Excess sand on the surface soon works down through the steel to fill up local low spots or blows away. A transverse crown of 1½ percent is carried from the edges toward the center of the strip. Experience has shown that the sand subgrade when graded on straight slopes to an apex at center of runway settles into a desired curved crown within a few days under traffic.

Umnak alone proved the worth of steel mat surfacing even if another field had never been built in the Aleutians. When the Japs were threatening to invade Alaska and the islands in 1942 the engineers were working fast to get the airfield at this site completed for the protection of Dutch Harbor. Time was short, so instead of grading up the usual sand base the engineers laid the pierced plank mat directly on the tundra, that grass-covered swampy ground that covers all of the Aleutians. Their judgment and speed paid off in big dividends, for within a few days after enough mat had been laid to form a suitable landing strip for a fighter squadron the Japs attacked Dutch Harbor. One Umnak-based squadron took off from the steel-paved swamp and went to work on the invading fleet. Taking advantage, as always, of local materials whenever possible, the Army Engineers used a mountain of volcanic cinders at Umnak for surfacing the permanent airport on that island.

Airport built in tidal swamp

At Adak, about two-thirds of th way out in the Aleutian chain, o islands, one of the most amazing ai ports in the world was built with re markable speed. Our troops made a amphibious landing on Adak Sweeper Cove at the south end Kulak Bay on Aug. 31, 1942. As

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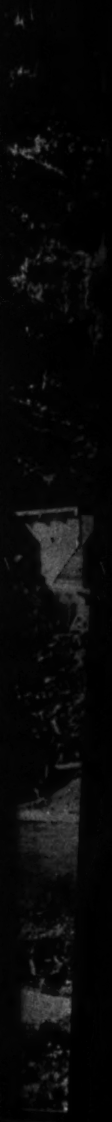nstruction